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Archaeological and Osteological Analysis of Two Burial Sites along Harlan County Lake, Nebraska: Chronological and Evolutionary Implications

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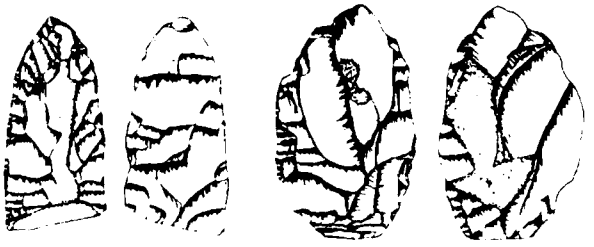

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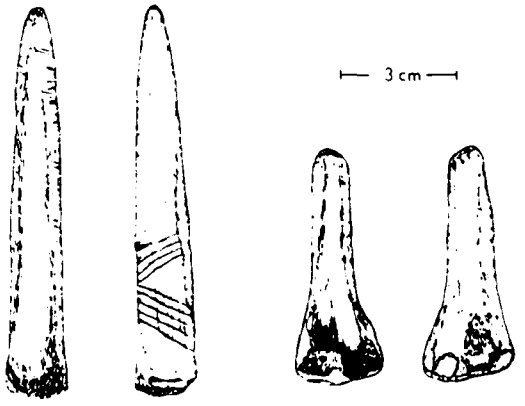

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ABSTRACT

Three adult females of various ages and one juvenile are represented in the osteological material recovered from site 25HN118. No absolute dates were calculated for this site. Mortuary practices inferred for site 25HN118 are compared to those of the Valley and Keith focus of the Plains Woodland tradition. Differences in the amount of grave offerings and the frequencies of certain bone elements are an important indicator of cultural affiliation. Based on these differences, 25HN118 appears to be affiliated with the Valley focus. The remains of an individual male were recovered from site 25HN174. This site has been radiocarbon dated at 1600 ± 110 years before present. Cranio-metric relationships among Plains Indians indicate that a gradual increase in head height, as reflected in the Auricular Mean Height Index, occurred from approximately 5000 to 1000 years before present among the Middle Missouri, Central Plains and Northwestern Plains samples included.

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Various individuals also assisted in the analyses. Fore-most is George W. Gill who provided valuable assistance in completing the osteological analyses. Much of what is presented here has, in one way or another been improved by his input. Phillip J. Haram, D.D.S. assisted in analyzing the dental remains and provided the X-rays of several pathologies.

We would also like to thank several individuals for their assistance in providing valuable information. Special thanks go to Marvin Kivett, Nebraska State Historic Preservation Officer. He has willingly provided us with valuable information regarding the prehistory of Nebraska through both his published work as well as personal communication. Michael Finnegan, Ann Johnson and the personnel at the National Park Service, Midwest Archeolo-gical Center provided valuable background data for the analyses presented here. Finally, the authors would like to thank Stephen L. Bieber, Michael McFaul and Ross Hilman who have taken the time to discuss the analyses presented here.

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CHAPTER ONE

INTRODUCTION

The following is a report on the analyses of osteological and cultural materials recovered from two archaeological sites located along Harlan County Lake, Nebraska. This work was done by Larson-Tibesar Associates under a contract (DACW41-82-M-1218) between that company and the United States Army Corps of Engineers, Kansas City District.

The original contract called for "the scientific excavation and analysis of human osteological remains from site 25HN118...In addition, an isolated burial...shall be analyzed with those burials from 25HN118." Subsequent modifications in this contract were necessary due to the fact that the area designated for excavation has remained under water. These modifications deleted any reference to excavation. In addition, the so-called "isolated burial" has been designated site 25HN174.

Osteological materials, associated artifacts and all available information on excavations conducted at the sites were sent to Larson-Tibesar Associates as part of the agreement. Four individuals have been identified from the osteological materials recovered from 25HN118. Site 25HN174 contained the remains of a single individual. Very few artifacts were recovered from 25HN118. No cultural material was found in direct association with the burial at 25HN174.

As stated in Tibesar (1983:9):

The goals of the proposed research and associated analysis are to:

1) describe the quantity and nature of skeletal remains recovered from 25HN118 and the isolated burial [25HN174];

2) present metric and morphological characteristics of the skeletal material;

3) determine the burial customs;

4) describe any pathologies present;

5) indicate possible relationships (both spatial and temporal) between the skeletal material recovered from site 25HN118, the isolated burial [25HN174] and other documented populations from the Plains;

6) assess the effects which periodic inundation has had upon the skeletal remains present at 25HN118;

7) analyze and describe the cultural material found in association with the skeletal material and;

8) attempt to date the burial.

The results of analyses conducted on the materials from sites 25HN118 and 25HN174 were somewhat limited by the fact that excavation of these materials was not conducted by Larson-Tibesar Associates. It was therefore necessary to either assume certain aspects of the archaeological data base or, as was most often the case, to forego any interpretations based on missing data. Limitations of the archaeological data base and resultant analyses are carefully described throughout this report.

As will be seen in the following chapters and appendices, the authors have described the analyses conducted, made some basic interpretations and have presented the data gathered for use in future research. These data and the resultant interpretations should not, however, be construed as the end of studies at sites 25HN118 and 25HN174. In the future, additional excavations may be conducted at these sites or sites of a similar nature. It is hoped that further analysis of materials collected as a result of such excavations, as well as analysis of materials already available from similar sites, will yield additional information geared toward resolving many of the questions posed here.

Treatment of the Osteological Material

Prior to our receiving the osteological materials, reconstruction of several of the long bones and cranial fragments had been conducted. This was apparent due to the fact that some bone fragments were glued together while others exhibited the remains of glue along fractures. The majority of osteological materials were fragile and stabilization, particularly the proximal and distal ends of long bones as well as all ranial elements, was considered necessary in order to accurately assess stature and other physical characteristics.

No difficulties were expected as a result of this stabilization since it was anticipated that additional materials suitable for dating purposes would be recovered through the excavation of 25HN118. However, subsequent contract modifications deleted the proposed excavation from the original scope-of-work and this has prevented the present investigation from obtaining an absolute date for site 25HN118. Any future investigations of this site should attempt to radiocarbon date the burial through the use of either bone or charcoal samples.

Absolute Dating

At the time the analyses began, neither site containing osteological remains had been radiocarbon dated. Since completion of the analyses, a radiocarbon date of 1600 $\pm$ 110 years before present (Beta 10209) has been calculated for the burial at site 25HN174. This date was obtained from a small charcoal sample found in association with the osteological material.

Since the amount of charcoal was less than one gram, accelerator dating techniques (AMS) were employed.

No absolute date has been obtained from 25HN118. No charcoal suitable for dating purposes was recovered from site 25HN118.

CHAPTER TWO

ENVIRONMENTAL SETTING

Location

Sites 25HN118 and 25HN174 are located in extreme southcentral Nebraska approximately two miles (3.22 km.) southeast of the town of Alma and six miles (9.66 km.) north of the Kansas-Nebraska border (Figure 2.1). The sites are along the northern shore of Harlan County Lake and adjacent to Methodist Cove which empties south into the Republican River. The original channel of the Republican River, inundated since 1952, is located approximately one-half mile (0.8 km.) to the south of the two sites.

Physiography and Drainage

The sites are located in the Loess Plain region of southern Nebraska. To the north is the Sandhills region of Nebraska. The Blue Hills Upland and Smokey Hills of Kansas are to the south. The area is characterized by a broad, eastward-sloping plain dissected and modified by the valleys of the Republican River, Sappa Creek, and Prairie Dog Creek (Mitchell et al. 1974).

The Republican River, which flows eastward, is the major drainage of the area. Numerous north-south drainages, such as Methodist Creek, empty into the Republican River. These drainages have carved the loess plain into a series of nearly parallel divides. These divides are, for the most part, nearly level with gently sloping tops and moderately sloping to steep sides (Mitchell et al. 1974).

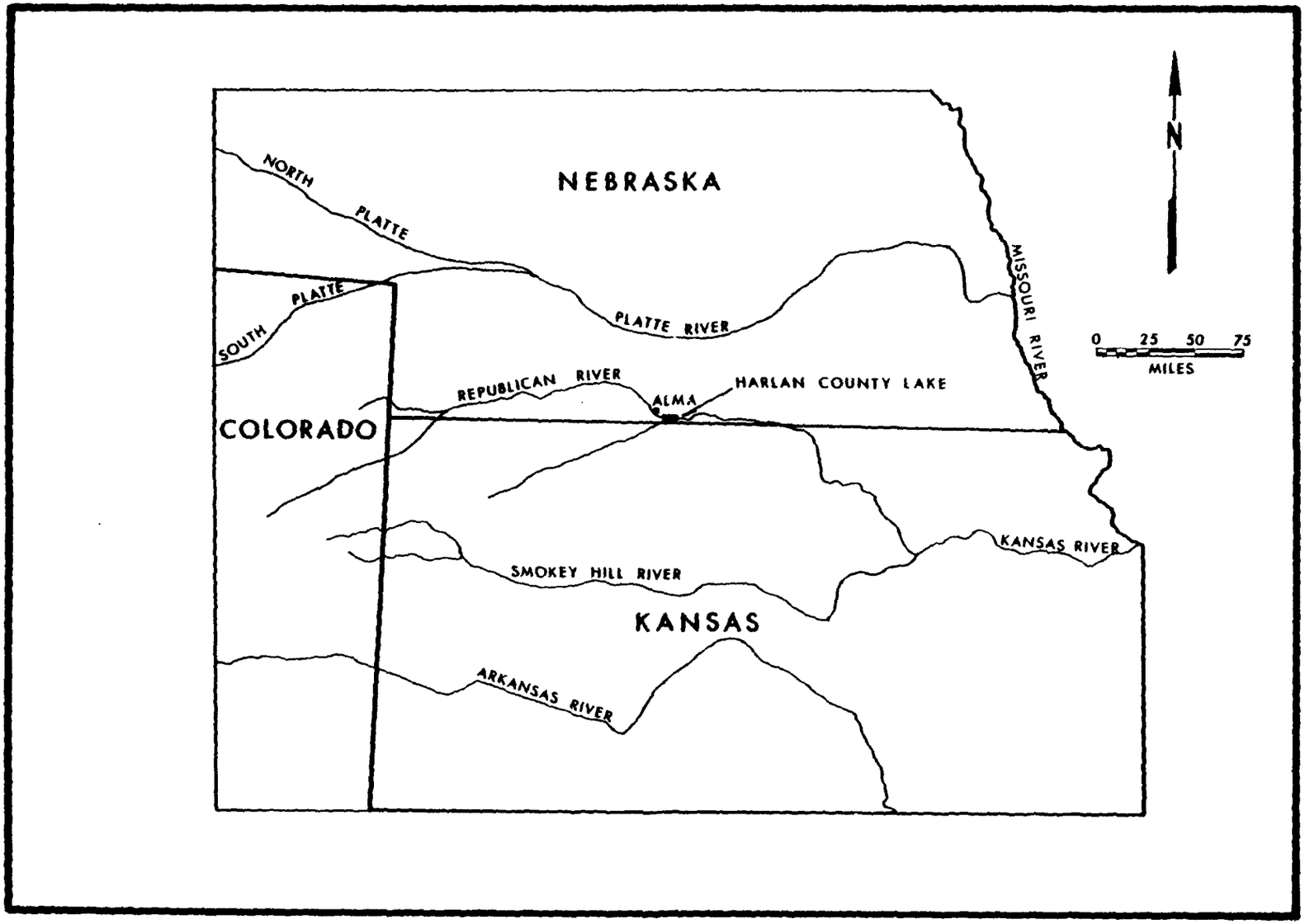


Figure 2.1. Location of Harlan County Lake. (Map adapted from Roetzel 1982: Figure 1).

Soils

Soils in the vicinity of the two sites are of the Holdredge-Coly-Uly Association. "This soil association is made up of upland areas mantled with a thick deposit of loess....The soils are nearly level to very gently sloping" (Mitchell et al. 1974:2). At the site areas, soils are of the Holdredge or Holdredge-Uly Series. These are examples of mature soils with well developed A and B horizons (Mitchell et al. 1974).

Climate

Climate of the area is perhaps best described by extremes. Temperatures recorded in Harlan County have been as high as 116 degrees Fahrenheit (46.6° C.) in 1934, and as low as -38 degrees Fahrenheit (-38.9° C.), in 1899 (Myers 1974:62). Data recorded at Alma indicate that July and August are the hottest months of the year while December and January are the coldest. Average date of the last freeze is May 2 and average date of earliest frost is October 7 (Myers 1974).

The amount of precipitation recorded at Alma, Nebraska averages 22.3 inches (56.5 cm.) per year with nearly 80 percent occuring during the months of April through September. June receives more precipitation than any other month (Myers 1974). "The area is very close to the mythical line, on or near the 100th meridian, which John Wesley Powell long ago designated as the point west of which farming could not be carried on without irrigation" (Dunlay 1979:76).

Vegetation

The vegetation along and south of the Republican River in south-central Nebraska can been classified, in broad terms, as Bluestem-Gramma Prairie. Two other broad vegetational categories are also close to the Republican River. Just to the northwest is Wheatgrass-Bluestem-Needlegrass Grassland

and just to the northwest is Bluestem Prairie (Kuchler 1975, Bailey 1976). This may well indicate a diversity of vegetational communities and plant species in the vicinity of the Republican River.

While the vegetational sections, as mentioned above, have been included within the Tall-grass Prairie province (Bailey 1976), the area along the central Republican River lies at the western edge of the province and has been described as an area of transition between Tall-grass and Mixed-grass Prairie (Weaver 1965).

In drier or highly overgrazed areas, such short-grasses as Bouteloua gracilis and Buchloe dactyloides may be dominant. Other situations may have an overstory of mid-grasses such as Bouteloua curtipendula, Agropyron smithii, Koeleria macrantha, Stipa comata, S. spartea, and Sporobolus cryptandrus. Andropogon scoparius may be part of this assemblage as well, but may be more prevalent on slopes. Tall-grasses such as Andropogon gerardi, Panicum virgatum, and Sorghastrum nutans could be found in deep, moist ravines and river bottoms. Trees such as Populus spp., Fraxinus pennsylvanica, Acer negundo, and Ulmus americana may also be found along deep drainages and on bottom lands. Some forbs which have been listed for Mixed-grass Prairie, and probably occur in this region, include: Liatris punctata, Solidago missouriensis, S. rigida, Ratibida columnifera, Echinacea angustifolia, Psoralia argophylla, Gaura coccinea, and members of Astragalus, Petalostemon, Oxytropis, and Opuntia. Occasional shrubs or subshrubs include Artemisia frigida, Gutierrezia sarothrae, Amorpha canescens, Calylophus serrulatus, Rosa sp. and Yucca glauca (modified from Weaver 1965, Bailey 1980, Mitchell et al. 1974). It is also likely that extremely moist or wet areas along streams may support a wet meadow or marsh dominated by Carex spp., Scirpus spp, Eleocharis spp., Typha

latifolia, or hydrophilic grasses such as *Spartina pectinata* and *Phalaris arundinacea*.

CHAPTER THREE

CULTURAL SETTING

Central Plains Taxonomy

In the prehistoric outline which follows, several basic decisions had to be made concerning the mode of presentation which would be most appropriate for the present project. The burials under study had not been radiometrically dated when research began. Further, even with absolute dates, it is often quite difficult to assign an archaeological assemblage to the "correct," or at least most useful, taxonomic unit. It was therefore concluded that the prehistoric outline, in order to be useful, should be prepared in a manner which would present as many usable and definable taxa as possible, describe their general characteristics and, since the present study deals with human burials, to place special emphasis on the known burial practices of each.

While the most recent prehistoric overviews presented for Harlan County Reservoir (Pepperl and Falk 1979; Roetzel 1982) are by no means inaccurate, they were designed primarily to be an aid in conducting a surface inventory. As such there was not a great need to be overly specific. Surface indications of prehistoric sites are often somewhat ambiguous and to attempt detailed classification of such items often becomes more confusing than helpful.

In the case of excavated materials, however, it is often advantageous to draw as many comparisons as possible with previously described and dated materials which may be similar. In order to make such comparisons, it is

necessary to discuss the archaeological units which have been recognized for the general area of the study.

The taxonomic scheme outlined below has been developed primarily as a framework within which data potentially relevant to this study can be presented. As such, it is neither in total agreement nor total disagreement with previous taxonomic classifications utilized in the Central Plains. A "finalized" cultural taxonomy for the Central Plains subarea (if such a concept is even valid) is far beyond the scope of the present project and it is not assumed that other investigators will automatically accept the scheme used here.

Most recent classifications of archaeological units in the Great Plains have either directly or indirectly indicated that both chronological control and a concept of cultural-historical development are necessary in order to best describe prehistoric manifestations. The traditional concept of a "period" as a rigid block of time (e.g. Krieger 1953:247) is not a sufficient scheme by itself. This is because various cultural manifestations are now known to have overlapped and coexisted on both sides of arbitrary time lines. On the other hand, the use of the unmodified cultural-historical development scheme as developed by Willey and Phillips (1958) would tend to disregard or overlook basic and important research questions which are clearly related to absolute chronology.

A number of writers have attempted to resolve this problem. In his discussion of the prehistory of the Plains area Willey (1966:311-313) uses what are essentially two separate schemes: Cultural traditions to discuss the characteristics of prehistoric lifeways and cultural periods to describe absolute blocks of time. Lehmer (1971:29-30) uses the term "period" to indicate "an epoch during which there was a dominance of a particular culture climax, or major cultural tradition..." This would seem

to imply that, while Lehmer did draw somewhat arbitrary lines to divide his periods, he realized that such lines only delimited the "dominance" of a particular cultural tradition and not necessarily its total existence in time. Frison, taking a different approach, suggests that the term "period" should be used to reflect changes in economic subsistence patterns: "cultural stages are involved and arbitrary time lines are not realistic unless there are concomitant observable cultural changes" (Frison 1978:20).

The differences between these three approaches can be seen in Figure 3.1. Since they are entirely separate concepts, Willey's (Figure 3.1a) phases and cultures crosscut his periods. For the Central Plains and Middle Missouri subareas, Lehmer presents complexes and traditions which are contained within period boundaries (Figure 3.1b) since these are seen as the major or dominant manifestations within all of or a portion of a period. On the other hand, Lehmer seems to contradict himself in that "foraging complexes" in the Northwestern Plains subarea are viewed in a more fluid manner which allows them to crosscut periods. Although less detailed, Lehmer's description of Northwestern Plains complexes is consistent in philosophy with the scheme presented by Frison (i.e. that such units represent economic subsistence patterns, not blocks of time; see Figure 3.1c).

Since none of the schemes discussed above seem to have received universal acceptance in the Central Plains subarea, it would seem to be advantageous to combine the most useful characteristics of each so that the most accurate comparisons can be drawn. Figure 3.2 presents a chronological and developmental sequence which will be used throughout the rest of this discussion. As with Willey's (1966) presentation, an explicit distinction has been made between chronological units (periods) and units which

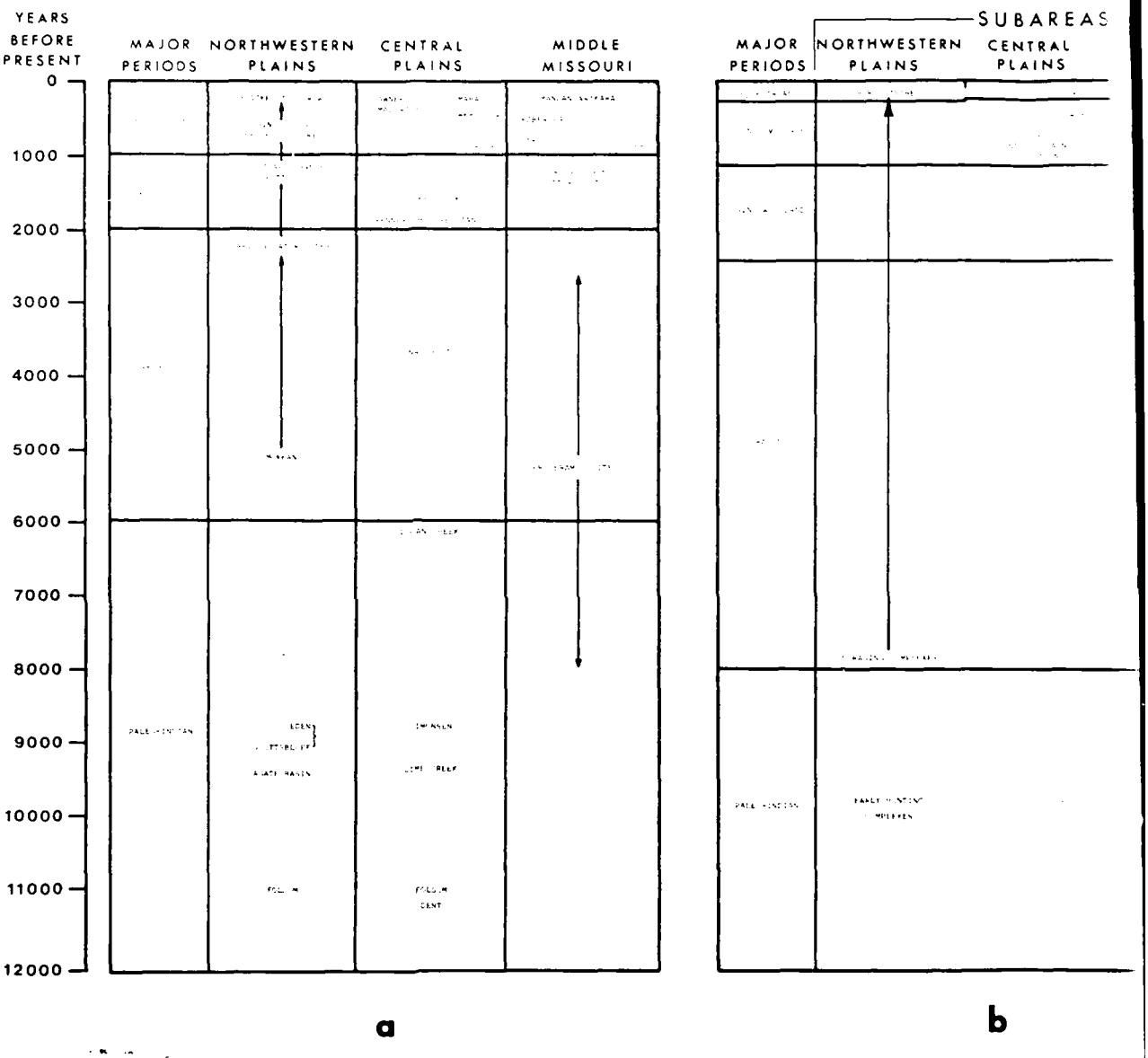
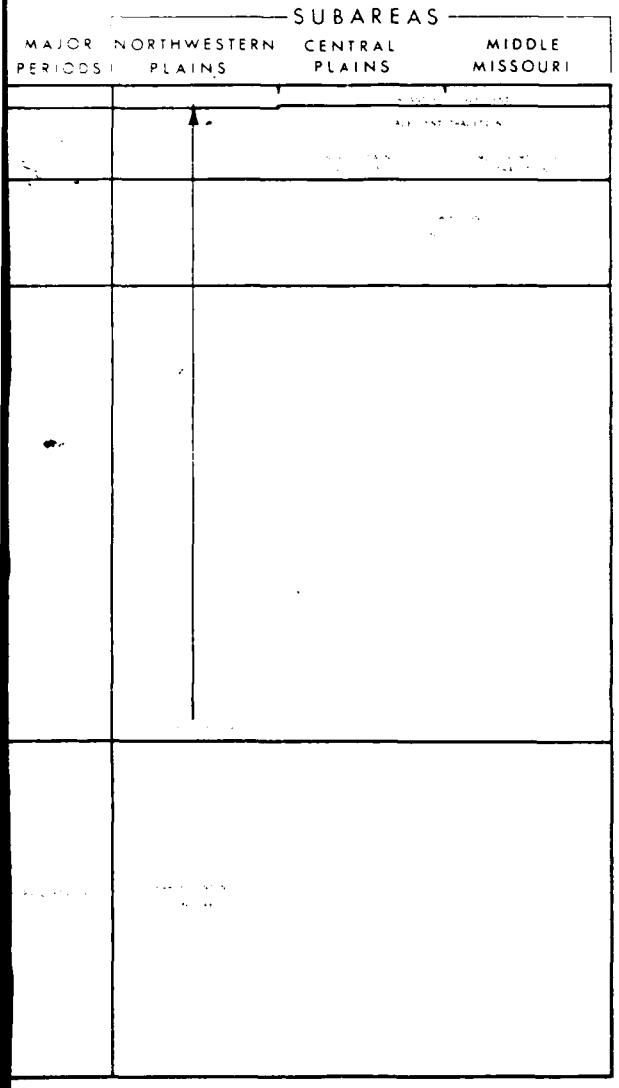


Figure 3.1. Taxonomic schemes which have been proposed for the Plains. 3.1b from Lehmer (1971); and Figure 3.1c, developed for the No



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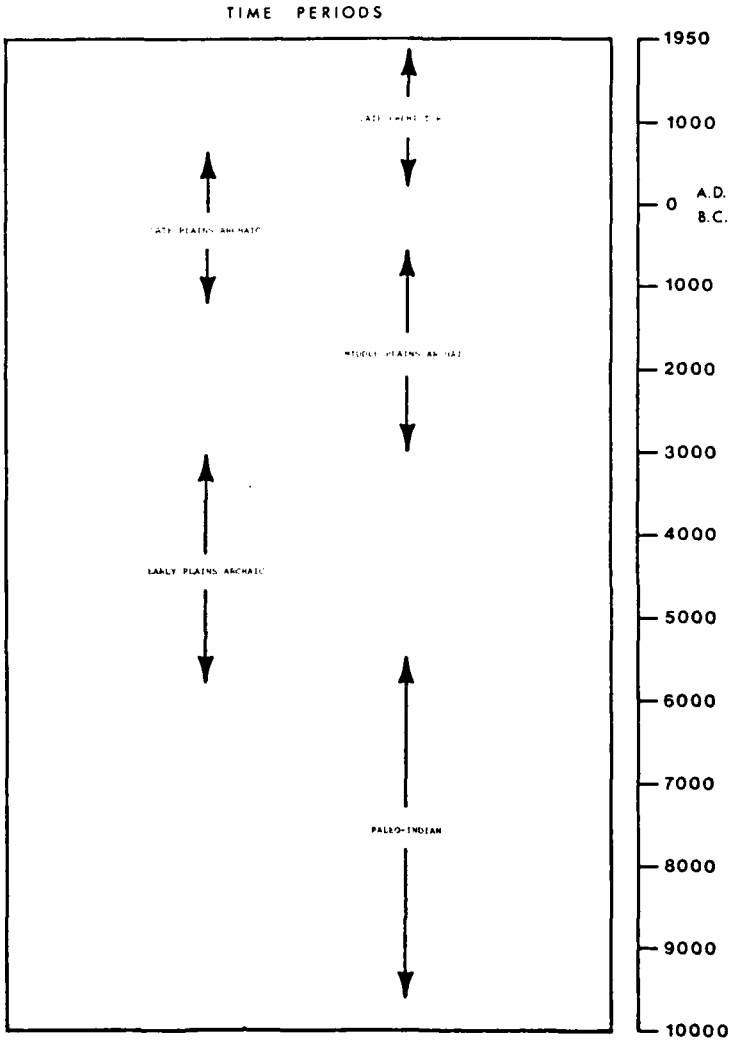

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been proposed for the Plains. Figure 3.1a adapted from Willey (1966); Figure
igure 3.1c, developed for the Northwestern Plains, adapted from Frison (1978).

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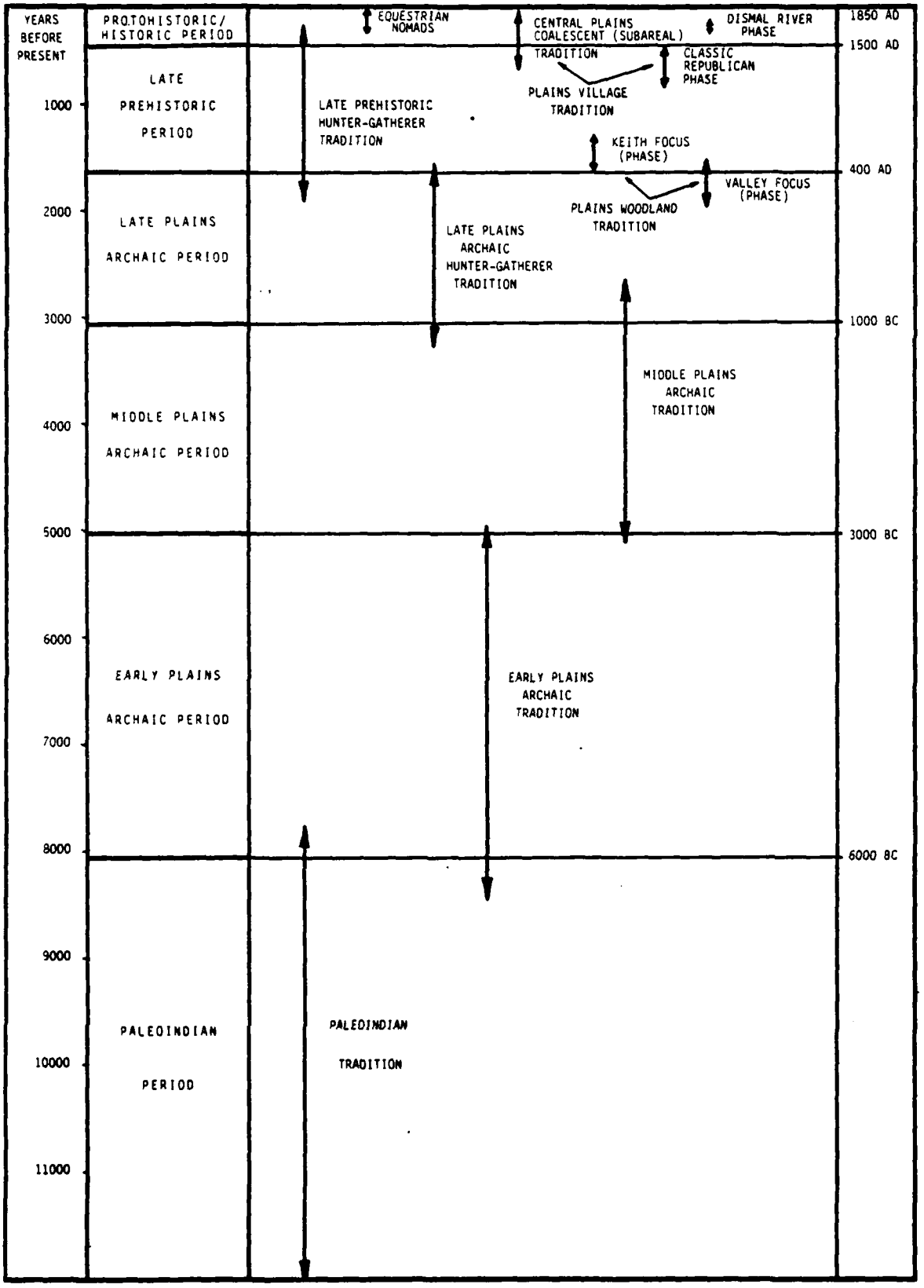


Figure 3.2. Proposed taxonomic scheme for cultural manifestations which may be related to the archaeological remains at sites 25HN118 and 25HN174.

more closely correspond to cultural-historical development (traditions, variants, phases, etc.). However, greatly increased data since the publishing of Willey's synthesis make the categories used by him somewhat inadequate.

For the purposes of this study, the chronological framework proposed for the Northwestern Plains by Frison (1978) has been expanded to include the Central Plains subarea. This scheme is utilized since it categorizes more recently discovered and/or dated cultural components and also articulates quite well in terms of nomenclature and definition with recognized sequences in the western Prairie Peninsula (e.g. Anderson and Semkin 1980).

It should be noted that, while the terms for the periods utilized by Frison are the same, his concept of overlapping periods (see Figure 3.1c) has not been incorporated here. It is believed that a more appropriate term for such a concept is "tradition:" "A (primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms" (Willey and Phillips 1958:37). As with Willey's original scheme for the Plains, the names for many periods and traditions are the same. This is closely analogous to Lehmer's (1971:29) concept in that the period name reflects the "dominance of a particular culture climax, or major cultural tradition."

With respect to Valley and Keith manifestations of the Plains Woodland tradition, "focus" has been retained as part of the name for each. While it is realized that focus is a term related to the Midwest Taxonomic System (McKern 1939) and not the Willey and Phillips system, it occurs so often in the literature when discussing Valley and Keith materials that it would confuse matters to eliminate it. For this reason, in Figure 3.2 as well as elsewhere in this report, notations such as "the Keith focus (phase)" occur

to point out that such a unit is probably best considered a phase as that term is defined in the Willey and Phillips system.

Valley, Keith and many other Plains Woodland manifestations have been referred to by A.E. Johnson (Johnson 1973; Johnson and Johnson 1982) as variants rather than phases. A concept of "variant" is not present within the original Willey and Phillips scheme. The term was originally used by Lehmer (1968:9) in the Middle Missouri subarea and was later extended to the Central Plains by Krause (1969:95). Krause (1977:10) defines the variant as:

> "...a range taxon which has less content, greater time span and greater spatial spread than a phase, but less time span than a tradition and less spatial spread than a horizon....So construed, the variant fits securely within the paradigmatic logic of the Willey and Phillips System.

Many objections have been raised concerning the use of the term (e.g. Blakeslee et al. 1982; Zeier 1982). For the purposes of this study, variant is viewed as a viable taxon, but has been used at a somewhat different level of integration than the term has been employed by Johnson. The subdivisions of Plains Woodland (Middle Woodland, Early Late Woodland, etc.) are here considered variants and the subdivisions of these (Keith, Valley, Sterns Creek, etc.) are considered phases.

In the discussion which follows, primary emphasis has been placed on those archaeological manifestations which may have been responsible for the burials at 25HN118. Because of the highly variable nature of the prehistoric data in the Central Plains subarea, some of the discussions will be presented at the tradition level while others can be narrowed down to the discussion of a single phase represented in the region.

As Figure 3.2 illustrates, the known temporal span of many traditions and/or phases is such that they overlap one another in time. This is

particularly true for cultural manifestations which occurred from the last one-third of the Late Plains Archaic period up to the Protohistoric/Historic period. Due to these overlaps, for instance, no "Woodland period" can be recognized since various Woodland manifestations now appear to have co-occurred with other groups both during the Late Plains Archaic and the Late Prehistoric periods (see Figure 3.2).

It is important to understand the potential ramifications of such temporal overlap to the present study. In many cases neither relative nor absolute dates, by themselves, should be used to conclusively link an archaeological manifestation to a particular cultural tradition, variant or phase. To do so greatly oversimplifies what is known about the archaeological record, particularly during the last two thousand years.

Following the spatial terminology proposed by Krause (1969), the study area is considered to be a locality within the Loess Plains region of the Central Plains subarea which is part of the Plains area. While the spatial distinctions between the Central Plains, Southern Plains and Middle Missouri subareas are fairly clear, the reader should be aware that distinctions between the Central Plains, the Northwestern Plains, and the Prairie Peninsula are much more vague. No attempt is made here to more clearly define these boundaries since it is believed that to do so would tend to indicate cultural barriers which may not have existed.

Plains Paleoindian Tradition

Age:

The Paleoindian tradition on the Great Plains is known to have been in existence from at least 12,000 years before present (B.P.) to approximately 7,000 B.P. (Wedel 1961:280).

Location and Associations:

The tradition is believed to have been present in all subareas of the Plains and materials of similar age and appearance occur throughout much of North America.

General Characteristics:

To many the Paleoindian tradition on the Plains has become synonymous with "Big-game hunters." While present evidence clearly indicates that big-game hunting was an important factor during the Paleoindian tradition it is questionable (1) whether it was really more important during this tradition than it was for later traditions and (2) whether the emphasis of big-game hunting, if it was truly an emphasis, remained essentially unchanged during the 4,000 years of the Paleoindian tradition.

The development of weaponry and techniques for large communal kills of megafauna is certainly an important aspect of Paleoindian lifeways and this is reflected in the Paleoindian sites that have been investigated in Nebraska (e.g. Barbour and Schultz 1932; Agenbroad 1978). But it is difficult to assess what proportion of the subsistence base came from these types of activities. The picture may be biased both because of the tendency for investigators to concentrate efforts on large, impressive sites and because of the problem of site visibility -- a problem which naturally becomes compounded with the increasing age of the deposits being considered. With regard to this, Frison (1978:19-20) has made the following comments:

> Another consideration is site visibility, which is a major problem faced by the high plains archeologist. Communal animal kills are of high visibility but provide evidence of only a small segment of the total cultural system. Associated butchering, processing, and camping areas are of high visibility but apparently did not preserve well, at least in the Paleo-Indian period . . . Most activities, however, of a small hunting and gathering group were manifestations of activities of short duration. Cultural assemblages were small and little was left behind so that most

> sites are manifest only by small amounts of debitage, simple tools, and possibly a broken projectile point.

As the data accumulate it becomes increasingly difficult to delineate a central theme which typified the Plains Paleoindian tradition. It can perhaps best be thought of as early Holocene complexes which exploited a wide variety of vegetational and faunal resources in a great diversity of environmental settings. In terms of socio-political organization, many of the patterns which were formulated, or at least existed, during the Paleoindian times continued to operate up until Euro-American contact on the Plains. Ultimately, the diversification rather than the specialization of subsistence patterns is perhaps the most important aspect of the Paleoindian tradition.

Burial Practices:

Very few human skeletal remains from the Paleoindian tradition have been discovered. In the Plains, the earliest such materials are from the Anzick site, a Clovis burial from near Wilsal, Montana (Lahren and Bonnichson 1974:148):

> In 1968 construction activities at a small, collapsed rock-shelter...resulted in the discovery of the first known Clovis burial...The burial assemblage contained the red ochre-covered remains of two subadults and over 100 stone and bone artifacts. The general artifact categories include fluted stone projectile points, ovoid and lanceolate bifaces, a blade, an endscraper, utilized flakes, and what we have termed bone foreshafts....

The closest known Paleoindian burial to the study area is the Gordon Creek burial from northcentral Colorado (Breternitz et al. 1971:170):

> The body of a woman, aged 25-30 years, was given primary interment in a pit coated with red ocher. The body was placed on its left side with the head to the north, was tightly flexed, and was also coated with red ocher. Burial accompaniments include a large precussion flaked biface or preform, a small biface used as a scraping tool, a hammerstone, an end scraper, a preform with fire pocks, cut and incised animal ribs, and a perforated elk incisor. A radiocarbon assay of bone material form the left ilium produced an age of 9700 ± 250 radiocarbon years: 7750 B.C. (GX-0530).

No indications of habitation which might be associated with the burial were located in its immediate vicinity.

While the two Paleoindian burials just summarized are widely separated in both time and space, it is interesting to note that both contained 1) primary, flexed individuals, 2) red ochre, and 3) a fairly high number of grave goods made out of both stone and bone.

The Early Plains Archaic Tradition

Age:

The earliest published dates for Early Plains Archaic materials seem to come from the mountains and foothills surrounding the Big Horn Basin in northern Wyoming and southern Montana in the Northwestern Plains subarea and from along the Missouri River on the eastern edge of the Central Plains subarea. Frison (1978:25,41-43) lists dates of 7685 ± 580 B.P. (5735 B.C.) for the Pretty Creek site, 7630 ± 170 B.P. (5680 B.C.) for the lowest Early Plains Archaic level at Mummy Cave and 7140 ± 160 (5190 B.C.) for the Lookingbill site. Recently published dates (Anderson et al. 1978) for the Logan Creek site (Kivett 1962) indicate that one of the Early Archaic levels dates at 7250 ± 300 B.P.

Farther to the northeast, near the Prairie-Plains contact, older dates have been reported for materials which closely resemble Early Plains Archaic. Agogino and Frankforter (1960), for example, have reported a radiocarbon date of 8430 ± 520 B.P. for the Simonsen bison kill in northwestern Iowa.

The most recent dates for Early Archaic materials seem to be in the neighborhood of 4500 years B.P. (e.g. Frison 1978; Anderson et al. 1980). The Early Plains Archaic Spring Creek site, 25FT31, in Frontier County, Nebraska, has been dated at 5680 ± 300 B.P. (Grange 1980:47).

Location and Associations:

In recent years, a steadily growing data base now indicates that Early Plains Archaic materials have been found over much of the Northwestern Plains subarea (e.g. Frison 1978; Benédict 1981) and across northern portions of the Central Plains subarea (e.g. Kivett 1962; Schmits 1978; Grange 1980; Anderson and Semken 1980). Similar materials have been found in the Ozark Highlands of Missouri (e.g. Ahler 1971), the forest-prairie ecotone of northwestern Minnesota (Shay 1971) and as far west as the foothills of the eastern Snake River Plain in Idaho (Swanson et al. 1964).

General Characteristics:

The best known Early Plains Archaic site in Nebraska is Logan Creek in Burt County (Kivett 1962). Wedel (1961:87) has presented a summary of Logan Creek materials:

> Here four occupation levels are indicated, all thought to represent a single culture or way of life. Among the features reported are stone-filled and plain hearths, medium to large points with wide shallow notches, side-notched or stemmed plano-convex scrapers, milling stones, bone awls and tubular beads, and a curved bone fishhook. Animal bones, especially those of bison still unidentified as to species, are common, as are freshwater mussel shells. Charcoal from the second level down has been radiocarbon dated at 4674 B.C.; by how much the two underlying levels antedate this we do not know. The points from Logan Creek show strong similarities to others reported from the Simonsen bison kill near Quimby, Iowa, in direct association with remains of the extinct Bison occidentalis and there dated, also by radiocarbon, at 6471 B.C. This suggests that at a time when early big-game hunters and their successors in the western Plains were making various forms of lanceolate and unnotched weapon points, contemporary big-game hunters in the east were fashioning dissimilar forms characterized by notches on the sides on the sides near the base. The relationships of the Logan Creek peoples were apparently with the Eastern Woodlands rather than with the early big-game hunters of the Western Plains.

Wedel's assumption of relationships to the east for the Logan Creek materials was made prior to the publishing of information on Altithermal-Early Plains Archaic sites from the Northwestern Plains. Frison, for

example, in discussing Early Plains Archaic materials from the Northwestern Plains, concludes that "relationships further to the east are not yet resolved but Logan Creek (Kivett 1962) materials seem to have close relationships both temporally and typologically" (Frison 1978:45).

The Spring Creek site, along a tributary of the Republican River in western Nebraska, appears to be an Early Plains Archaic habitation site. Grange (1980:47) summarizes the characteristics of the site:

> The assemblage represents a wide range of activities including food preparation and consumption as well as tool manufacture. Both hunting and collecting activities are represented at the site, and it most likely served as a general purpose base camp...
>
> The major subsistence was derived from the bison which was identified as a modern species rather than as an extinct form. Deer, antelope, small mammals, and birds were also eaten....
>
> The settlement consisted of small hearths associated with piles of waste bone and one possible storage pit....Evidence of the occupation was widespread on the terrace, and a large number, up to 554, hearth and bone pile units may have been present. However, the features may not have been so concentrated as in the excavated area, and some 64 hearth/bone pile loci may be more reasonable...
>
> Projectile points recovered from the site provide the best means of relating it to other Central Plains archeological assemblages. Kivett...described the Logan Creek Complex on the basis of excavations at the Logan Creek Site in northeastern Nebraska....The predominant point at the Logan Creek site is the small side notched indented base point. These are similar to those found at 25FT31. In addition there were some lanceolate points at the Logan Creek site. These too resemble the lanceolate points found at 25FT31....One chipped stone artifact characteristic of Logan Creek and some related Archaic sites is the side notched scraper. This type is missing at 25FT31.

Another important Early Plains Archaic habitation site is the Coffey site (14PO1) located in northeastern Kansas. Subsistence patterns proposed for the Coffey site are based on the utilization of a variety of resources. Schmits (1978:166) states:

> The subsistence activities of the Coffey occupants in late summer and fall consisted of a diffuse economy focused on the exploitation of plants and animals available from floodplain biotic communities. The most important procurement systems making

up the subsistence pattern included the hunting of bison, deer, waterfowl, fish and the gathering of a number of wild seeds and berries of which chenopods were the most important. Coffey was chosen as a campsite by these people because of the unique combination of resources available from the aquatic, floodplain forest and floodplain prairie communities intersected by the location of the site.

Burial Practices:

Few burials have been recovered which can be conclusively associated with the Early Plains Archaic tradition. The Turin burial in eastern Iowa has been briefly described by Anderson et al. (1980:263-264):

> [The site] has not been summarized, nor has a final analysis of the skeletal material been published. Four human skeletons were investigated in the silty loess approximately 6 m (18 feet) below the surface. One adult male, a child, an adolescent and an infant were recovered. The adolescent was found flexed on the right side, sprinkled with red ocher and with 18 shell beads near the ankles. One side-notched point was recovered resembling those from Cultural Horizon I at Cherokee. A radiocarbon determination of 4720 ± 250 RCYBP [radiocarbon years before present] has been made on the bone.

To the northwest of 25HN118, along the North Platte drainage in central Wyoming, an isolated burial was found which is Early Archaic in age. Zeimens et al. (1978:18-19) describe the Dunlap McMurray Burial, 48NA67:

> The main feature of the site was a prehistoric Indian burial containing the human remains of an old age (ca. 50 years) adult male. The skeleton is complete except for parts of the hands and feet that were removed by the scraper at the time of discovery. The skeleton was fully flexed, interred in a shallow pit dug into the Holocene sand terrace....The head was oriented southeast and the body was lying on its right side with the head lying on the right humerus. The left hand was under the right femur and the right hand was by the face...Grave dimensions were thirty-five inches north-south and twenty-two inches east-west....[The burial matrix] was probably a sandy mud that was deliberately packed around the body before the pit was refilled. No grave goods were found with the skeleton....Associated features include a minimum of 60 fire pits scattered over an area approximately 100 yards square...At least one bell-shaped pit was present which contained fragmentary burned bone (probably Bison bison ssp.), fragments of fresh water mussel shell, small pieces of fire cracked rock, and several pieces of burned roots, probably sage (Artemisia sp.)....Charcoal samples from two of the excavated fire pit features were submitted for dating. The first of these (R.L. 543) yielded a date of 5250 ± 150 years B.P. or 3300 B.C., while the

other sample (R.L. 651) was dated at 5350 ± 160 years B.P. or 3400 B.C.

Due to the amount of distance involved, it cannot automatically be assumed that Early Archaic burials from southcentral Nebraska would resemble either of the examples just described. It is possible that more relevant, but as yet unpublished, materials are present within existing collections from Nebraska and Kansas.

The Middle Plains Archaic Tradition

Age:

Frison (1978) has published radiocarbon dates acquired by R.B. Forbis, W.D. Strong and M.E. Kirby for the Signal Butte I, believed to be a McKean complex, Middle Plains Archaic tradition component, at the Signal Butte site in western Nebraska. Those dates are 4550 ± 22 and 4170± 250 B.P. (Frison 1978:47,53).

Location and General Associations:

The Middle Plains Archaic tradition has been extensively studied at sites in the central portion of the Northwestern Plains subarea (e.g. Mulloy 1954; Wheeler 1954). It is presently unknown if McKean materials are present in the region of Harlan County Lake, but this seems likely due to the recorded presence of such materials near the North Platte drainage in western Nebraska (Strong 1935) and near the South Platte River in southeastern Colorado (Metcalf 1973). McKean materials do not seem to occur in multiple occupation sites such as Cherokee Sewer (Anderson and Semken 1980), to the east of the study area, but they are fairly common in the Middle Missouri subarea (e.g. Neuman 1964).

General Characteristics:

Frison (1978:48-49) has described a number of characteristics which seem to be prevalent during the Middle Plains Archaic tradition, at least as it is known in the Northwestern Plains:

> During the Middle Plains Archaic period human groups moved into the open Plains and the interiors of the intermontane basins, and they seem to increased their emphasis of plant foods. In the dry interior of the Bighorn Basin, for example, the diagnostic artifacts (besides projectile points) are the flat sandstone grinding slab and sandstone mano....Along with these are found large numbers of roasting pits....These pits are usually found in
>
> sandy or clay areas, which were easier to dig into with simple tools....
>
> I do not believe that this cultural and economic change represents human groups of vegetarians who excluded the larger game animals from their diet. The evidence is very much to the contrary and suggests instead a carefully calculated scheduling of economic activities to coincide with food sources in a wide range of ecological areas from season to season.

Of the projectile points known to have been in use during the Middle Plains Archaic, Strong's (1935:279) description of the materials from Signal Butte I seem quite representative:

> a leaf-shaped point of medium to large size, especially one with a concave base, very similar in outline to the Folsom point....On the other hand, the Signal Butte I people also used a smaller number of medium-sized to large stemmed points....

Burial Practices:

Very little is known concerning the burial practices of the Middle Plains Archaic tradition. Few skeletal remains have been found in Middle Plains Archaic sites and when they have been found it seems questionable that they are the result of intentional burial. Frison (1978:423) states the following concerning human skeletal remains from McKean complex sites:

> A human skull was recovered from the McKean site in northeastern Wyoming (Mulloy 1954). It was probably not a true burial, since the skull was fragmentary when recovered and must have been in the same condition when deposited. It may have been some sort of trophy. The skull was described by Steward (1954) and should be

somewhere around 4000 to 4500 years old. A situation in many ways similar to that at the McKean site occurred at another of the same time period. The human skeletal material was limited to a single molar, most of a hand including the radius-ulna, several ribs, and a part of the sternum of a immature person.

The above descriptions are quite similar to the undated material found below a Duncan (i.e. McKean complex) level at the Medicine Crow site in South Dakota. Bass (1976) indicates that the single cranium probably dates between 5,000 and 2,000 B.C., but this estimate is not based on absolute dates. In fact, the skull seems to have been located in between two cultural levels, both of which contained Middle Plains Archaic materials.

Late Plains Archaic Hunter-Gatherer Tradition

Age:

Frison (1978:58) lists dates between 1230 and 3540 B.P. for the Late Plains Archaic and it seems reasonable to expect similar dates in the Central Plains subarea. The Late Plains Archaic level (Signal Butte II) from the Signal Butte site in western Nebraska (Strong 1935) has been radiocarbon dated at 2639 ± 200 B.P. (Frison 1978:58). Similar but undated materials were also encountered at Ash Hollow Cave (Champe 1946).

Location and Associations:

For the purposes of this study, a Late Plains Archaic hunter-gatherer tradition is assumed to have been present in the entire Great Plains area.

General Characteristics:

During the Late Plains Archaic period, there is considerable overlap in time and space between groups which apparently continued a basic pattern of hunting and gathering and others which may have been increasingly sedentary. The first of these, which is referred to here as the Late Plains Archaic hunter-gatherer tradition, is usually distinguished from

the Plains Woodland tradition groups primary on the basis of lacking ceramics. Wedel (1961:86-87) states that, as yet, little is known about these people:

> Of the later [i.e. cultures after circa 3,000 B.P.] peoples who must have hunted and gathered in the western Central Plains before the introduction of pottery-making, we know as yet very little. They are possibly represented by the second, or middle, level at Signal Butte, which is separated from the lowermost by some eighteen inches of wind-blown soil. Their traces may include also some of the cemetaries with tightly flexed burials and boat stones, but without pottery, that have been found at various localities in the North Platte drainage of western Nebraska. Farther south, the flexed burials of Scott County State Park in western Kansas, accompanied by simple bone and chipped-stone artifacts, may be yet another example.

Burial Practices:

Wedel (1959:473) describes an ossuary burial at the Young site, 14SC2, in Scott County State Park, Kansas, which contained no ceramics and thus may be associated with the Late Plains Archaic hunter-gatherer tradition:

> It seems safe to infer that burial in the flesh was practiced, since the bones in Nos. 3 and 5 certainly, and those in No. 1 probably, had been deposited in articulation and not secondarily as dismembered parts. None of the remains showed any evidence of cremation fires. In the case of the adults, at least, more or less complete flexation of the corpse was indicated. With the exception of No. 1, which had the head apparently at the south end, the graves seem to have been oriented with the long axis southwest to northeast and with the skull or skull fragments most commonly at the northeast end. There can be no doubt that interment was in dug pits; boulders placed in the upper part of the fill were apparently optional. If unworked, and doubtfully worked, mussel shells be included, mortuary offerings were present in all observed burials, though not in striking quantity.

Other artifactual materials found in the graves included a large stemmed projectile point, stone drills, split pebble scrapers, a bone awl and tubular bone beads. Five individuals were encountered in an area of excavation which was 35 by 40 feet in size (Wedel 1959).

Breternitz and Wood (1965:63-67) discuss similarities between the Young site and several sites located in northeastern Colorado and southwestern Nebraska:

> The flexed burials at the Bisterfeldt site, Hazeltine Heights, Howard Rollin's site, and the Young site seem to be manifestations of a particular mortuary complex which is representative of a Woodland occupation in the western plains and which is characterized by the following traits: flexed burials in pits with no consistency of orientation, tubular bone beads, Unio shell pendants, and, negatively, by the lack of pottery.... Each of these traits occur in a number of other contexts; however, the combination of all of them seems to be a particular culturally prescribed pattern. This mortuary complex can be roughly dated at around the 6th and 7th centuries A.D. on the basis of the radiocarbon dates from the Hazeltine Heights site and other dates from Woodland occupation sites along the Front Range in Colorado, which are thought to be roughly contemporary...There are also indications that this complex precedes a later pattern of ossuary interments.

The Dry Lake (25MP2) and Gering (25SF10) burials also exhibit basic similarities to the sites discussed by Breternitz and Wood (1965). Oothoudt (1976:162) suggests that "The Gering site is associated with the Colorado Plains Woodland mortuary complex due to flexed simple interments and the inclusion of tubular bone beads in the grave pits." Regarding the Dry Lake burials, Oothoudt (1976:164-166) states:

> The Dry Lake burials fit logically with the flexed simple interments of the Gering site and the Colorado Plains Woodland mortuary complex, as well as the generalized Archaic burial complex....The mode of burial and interred artifacts all seem to indicate the burials are either Archaic or early Woodland.

Although referred to as the "Colorado Plains Woodland burial complex," temporally and geographically this complex is perhaps best described as transitional between the Late Plains Archaic as defined by Frison (1978) and the Middle Woodland Valley focus (phase) as defined by Ludwickson et al. (1981).

Plains Woodland Tradition
Middle Woodland Variant
Valley Focus (Phase)

Age:

O'Brien (1971) believes that the time span for the Valley focus is between 50 B.C. and A.D. 100. D.W. Benn has suggested an extension of this range to A.D. 300 or 400 (Ludwickson et al. 1981:122).

Location and Associations:

The Valley focus of the Central Plains is known to be present in most of Nebraska, extreme southern South Dakota, western Iowa and northeasten Kansas. Other Middle Woodland materials which are probably either directly or indirectly related to the Valley focus include segments of the Kansas City Hopewell sequence (e.g. Johnson 1976, 1979; Johnson and Johnson 1975), the Woodland component at the LaRoche site (Hoffman 1968) and the Sonota materials (Neuman 1975) from the Middle Missouri subarea, and several sites having similar dates and ceramic characteristics in the eastern portion of the Northwestern Plains in Colorado and Wyoming (e.g. Irwin-Williams and Irwin 1966; Breternitz and Wood 1965; Wood 1971; Tibesar 1980).

Although Valley focus sites have been found in the Missouri Valley, their core areas seem to be in the valleys of tributary rivers and streams. Ludwickson et al. (1981:122) suggest that the preference for smaller secondary stream locations may be due to the fact that such locations offer easy access to both riverine and upland habitats.

General Characteristics:

Villages of the Valley focus are believed to have been quite small. The best evidence to date for settlement patterns of the Valley focus comes from the Schultz site, 25VY1, where the remains of ten small house struc-

tures were found in a consolidated area (Hill and Kivett 1940). These structures consisted of oval depressions 11 to 18 feet in diameter, usually with a central fire hearth. Construction seems to have been some form of stick-and-daub which Hill and Kivett (1940:188) suggest may have been covered with skins or matting. Occupation (or periodic reoccupation) at the Schultz site was of sufficient duration to produce 16 to 40 inches of cultural debris.

Floral and faunal materials recovered from Valley focus sites (e.g. Hill and Kivett 1940:182-184) suggest a paucity, if not total lack of horticultural activity and a heavy reliance on bison, other mammals and fresh water mussels. The lack of horticulture also seems to suggest that wild plant materials were also extensively utilized.

Of the artifactual assemblage attributable to the Valley focus, ceramics seem to be the most diagnostic. Ludwickson et al. (1981:123-124) offer the following description:

> Kivett (1949) proposed the type Valley Cord-roughened. This pottery is sufficiently inclusive as to subsume most relatively simple midwestern and Plains Middle Woodland ceramics. Valley Phase pottery is a thick (3 to 12 mm.), predominantly sand-tempered ceramic, apparently built-up rather than coiled (although this unclear), with exterior cording which was apparently applied by rolling rather than paddling, and usually oriented vertically with less frequent oblique and horizontal applications. The conoidal vessels had nearly vertical rims and flat, cord-roughened lips. Vessel diameter-to-height ratios vary from ca. 1:1.25 to 1:2.5, with vessel height reaching 73 cm. Punctating, embossing, dentate, and cord-wrapped stick stamping and impressing, incising or trailing were decortative techniques utilized.

Another characteristic which seems to distiguish the Valley focus from some later Woodland components is the use of large, side to corner-notched dart points. This is further discussed below under the general characteristics of the Keith focus.

Burial Practices:

Ludwickson et al. (1981:123) describe the burial patterns of the Valley focus as follows:

> Many burial mounds (as opposed to habitation sites) attributable to Middle Woodland have been excavated in South Dakota and Nebraska. Often, the identification as "Valley" has been hampered by absence of diagnostic ceramics (c.f. Neuman 1975 [Sonota materials]). O'Brien (1971) summarizes Valley mortuary behavior as internment of the dead of a fixed time period (a year ?), in a cleared area on a prominent hilltop. The dead were placed on the surface, not in a pit; a mound was then erected. Another burial mode involved primary interments with several accompanying secondary burials. Prepubescent youths apparently were not ceremoniously interred. The dead in the Taylor Mound were placed in a limestone cyst. Fire rituals on the mounds just prior to closing seem to have played a significant role in the cerimonialism.

This is consistent with the findings of Hill and Kivett (1940:182) at the Valley focus Schultz site, 25VY1:

> The remains of an adolescent were found in the village material over Feature 2. The burial...was semi-flexed with the bone articulated. The skeleton occurred at a depth of 36 inches with the head slightly higher than the feet. The burial was lying on its left side facing east. Village trash was well mixed with the bones and no evidence of a burial pit was discernable. The bones were well preserved and appeared to have been placed there in the flesh....There was no definite association of grave goods, although village materials such as mussel shells, potsherds, animal bones, burnt earth and ash were mixed among the bones.

Plains Woodland Tradition
Early Late Woodland Variant
Keith Focus (Phase)

Age:

O'Brien (1971:176), based on radiocarbon dates from Woodruff Ossuary and sites in the Upper Verdigris watershed in Kansas (Calabrese 1967), believes the Keith focus dates from about A.D. 400 to A.D. 800.

Location and Associations:

Wedel (1959:552-553) presents the following discussion of the geographic extent of the Keith focus:

> The Keith Focus has been set up on the basis of findings at several excavated village and burial sites, chiefly in the Republican River drainage of southern Nebraska and northern Kansas (Kivett, 1949, 1952, 1953)....
>
> The geographic extent of Keith Focus outside the Upper Republican valley center is not certainly known. For Nebraska, Kivett (1953, p. 132) reports pottery closely similar to Harlan Cord-roughened from Davis Creek in Sherman County, from the Sandhill region, and from Richardson County in the extreme southeastern corner of the State. To the south in Kansas, what appears to be the same or similar calcite-tempered ware is found in the Woodland level (Occupation B) at the Pottorff site and again at the Walter site, both in Lane County; in both places it is associated with a few non-calcite-tempered sherds that otherwise are essentially similar....Western Kansas, and perhaps parts of eastern Colorado, thus appear to lie within the range of the Keith Focus materials.

Woodland materials of similar age and appearance to the Keith focus include materials from the Scalp Creek and Ellis Creek sites (Hurt 1952) near the southern edge of the Middle Missouri subarea and a large number of apparently Late Woodland sites from the eastern portion of the Northwestern Plains (e.g. Gill and Lewis 1977; Reher 1971; Irwin-Williams and Irwin 1966). Hofman (1978) has proposed the Custer phase of the Southern Plains tradition in Oklahoma may be related to the Keith focus as well as later Central Plains tradition materials.

In some areas of the Central Plains, particularily along the Missouri River but also up its tributaries for at least short distances, the Keith focus is apparently followed by Late Late Woodland (Ludwickson et al. 1981:127) Sterns Creek materials. O'Brien (1971:176) believes the Sterns Creek focus dates between circa A.D. 500 to A.D. 900, but D.R. Haas dated Sterns Creek materials from the Walker-Gilmore site to as late as A.D. 1250 (Ludwickson et al. 1981:127).

Wedel (1959:549) indicates that the geographic range for the Sterns Creek focus, while not completely known, "do not appear to have extended very far westward from the immediate valley of the Missouri River." Due to this limited range of Sterns Creek and the fact that no similar constricted

rim ceramics are known to have been found in the vicinity of the study area, it seems unlikeley that any of the material at 25HN118 are related to this manifestation.

General Characteristics:

Wedel (1959:552-553) offers the following description of the Keith focus:

> Indicated are small communities, each with traces of not more than 4 to 6 structures occupying usually much less than an acre of ground; circular to irregularly elliptical shallow basins, sometimes with poorly marked fireplaces in the center, and thought to represent the sites of small perishable habitations constructed of poles and thatch or skins; postmolds and small refuse-filled pits scattered randomly about the living area; presence of deer, small mammal, and bird bones, as well as bison; absence of maize or other domestic plant remains, or of implements clearly designated for horticulture; and scarcity of pottery, stone, and bone artifacts as compared to those in later pottery-bearing sites in the region [i.e. Upper Republican sites in the Republican River region ?].
>
> Among the distinguishing characteristics of the Keith Focus is the pottery designated Harlan Cord-roughened. This is a thick-walled, calcite tempered ware, with allover cord roughening on vessel exteriors. The usual shape appears to have a large wide-mouthed jar, with more or less conoidal base, direct unthickened rim, and flattened undecorated lip. Fine cord or fabric imprints are often visible on interior sherd surfaces, these running at right angles to the heavier exterior impressions. Punched bosses, cord-wrapped rod impressions, and other decorative treatment of the rims, such as occurs in Valley Focus pottery, is absent from Keith Focus material.
>
> Work in stone includes a rather varied series of small to large stemmed and barbed projectile points, often serrate; end scrapers; small chipped celts; ovate knives, but no beveled types; irregular sandstone sharpening blocks, but no paired shaft smooters; pecking and hammer stones; and cupped grinding stones. Bonework consists of split deer metapodial and splinter awls; scapula "knives" or scrapers, but no hoes; plain, incised, and barrel-shaped bird-bone beads. There is more work in shell than in most other Plains sites, and this was associated for the most part with the mortuary complex. The shells of fresh-water mussels were fashioned into triangular and conscentric pendants, often corner- and end-perforated; disk beads from 6 to 18 mm. in diameter; short cylindrical beads with one flat side, with drilling from this surface and from one end so as to intersect at right angles; and occasionally other forms...

There are a number of characteristics which seem to be quite similar between the Valley and Keith foci. Among the most important of these is ceramics. Kivett (1953: 131) recognized these similarities but believed the two were at least somewhat distinguishable:

> Superficially, it [Harlan Cord-Roughened] resembles the Valley Cord-Roughened type, which characterizes the Valley focus of the Woodland pattern (Hill and Kivett, [1940], pp. 173-181). It appears, however, to be somewhat less well made and to lack the various rim and lip decorations of the Valley Cord-Roughened type. It is now evident that the thick, cord-roughened ware found throughout the Central Plains area represents at least two distinct foci of the Woodland pattern.

Perhaps one of the most distinctive changes to occur in the Keith focus is the apparent change in projectile point form. Wedel (1959:556) made the following comments regarding this:

> Kivett (1953, p. 136) has pointed out "some basic similarities" between some Upper Republican and Keith Focus Woodland burial practices. These include primary and secondary burials in a basinlike ossuary pit, and the occurence as mortuary accompaniments of shell disk beads, conch shell ornaments, Olivella and gastropod beads, flake knives or scrapers, end scrapers, shaft wrenches of deer-leg bones, undecorated tubular bone beads, and hammerstones. I have the impression, too, that Keith Focus may include more small projectile points perhaps tending toward the small triangular side-notched Upper Republican form than does Valley Focus, where somewhat larger stemmed and corner-notched types remind one of Hopewellian forms. I am not altogether convinced by the foregoing items; but they suggest that Keith Focus may be closer to Upper Republican, Valley Focus to Hopewellian.

There is considerable debate as to the degree to which various Woodland variants and/or phases were dependent upon horticulture. Johnson (1983:106-107), who also recognized the change in projectile point types noted above, views the use of cultigens during most of the Woodland tradition as "subsistence redundancies" rather than a full dependence:

> Of perhaps more significance to an understanding of prehistoric changes which took place in the Kansas City locality is the fact that the location of sites with corner-nothced arrowheads and cordmarked pottery in some abundance is indicative of a changed settlement pattern. This pattern, which is believed to character-

ize the latter part of the local Woodland period, includes small sites, probably occupied for only short periods of time, scattered along streams which are tributaries of the Missouri and Kansas rivers as well as on the interfluves....Although it has been demonstrated that at least some of these sites are hunting and gathering stations, others are believed to represent farmsteads established following the adoption of agriculture during the interval ca. A.D. 800-1000. In this model, the infrequent occurrence of the tropical cultigens corn and squash in Middle Woodland contexts...and native cultivars in Middle...and Early Late Woodland...settings would be interpreted to signify the use of these plants as subsistence redundancies, rather that as important first-line resources. Agriculture, as an important subsistence activity, would be a phenomenon of the latter part of the Late Woodland period.

In addition to the change in settlement patterns between the Early Late Woodland and the latter part of that episode in the Kansas City locality, other factors support this model. Perhaps most important among these is that despite the fact that there have been numerous recent excavations in Early, Middle, and Late Woodland sites in the Central Plains..., with one exception, none of these sites have produced convincing evidence of the use of cultigens as more than dietary supplements. The exception is the Two Deer site (14BU55) at El Dorado Lake in south-central Kansas. Two Deer produced abundant evidence of three cultigens (corn, pumpkin, and sunflower) radiocarbon dated to A.D. 1000 ± 25 (average of six dates). Associated artifacts are indicative of both Plains Woodland and Plains Village traditions, leading the excavator to the conclusion that the site represents a transitional period between two traditions....

Burial Practices:

In his monograph on Kansas prehistory, Wedel (1959:553) presents a very good summary of the Keith focus modes of burial:

The Keith Focus mortuary complex, largely through the work of Kivett (1953), is better known than that of many other Plains cultures that have been extensively investigated. Secondary interment of disarticulated skeletal parts was customary. Sometimes these remains are found in the village and camp area, but they are more often in terrace, bluff, or hilltop locations at a distance. In some cases, bundled or scattered bones of one or several individuals were placed in small pits 3 to 4 feet across and up to 6 feet deep, these pits tending to occur a few feet from one another in clusters (Strong, 1935, pp. 116-122; Wedel, 1935, pp. 174-179). Equally characteristic are larger basins up to 20 feet or more in diameter, within or under which there may be smaller pits. In these larger ossuaries, as exemplified at the Woodruff burial site in Phillips County, Kans. (Kivett, 1953), have been found the scattered remains of dozens or scores of individuals-so many, indeed, in comparison with the size of the

known settlements that it can be presumed these were the final repositories for the dead from several villages or camps. Charcoal, burned earth, and scorched bone fragments indicate that fire played a role in the burial rites. Mortuary offerings include large numbers-often running into the thousands-of shell disk beads and bead blanks, many of the latter unperforated, as well as shell pendants, chipped stone, and occasionally other items.

Plains Village Tradition
Central Plains (Subareal) Tradition
Upper Republican Variant
Classic Republican phase

Age:

Krause (1969:90) believes the Classic Republican phase ranges in age between A.D. 1100 and A.D. 1500.

Location and Associations:

The core area for the Classic Republican phase seems to be the central portions of the Republican River Valley in southcentral Nebraska and northcentral Kansas, but materials from the same phase have also been located along Republican River tributaries including Medicine Creek, Lost Creek and Prairie Dog Creek (Krause 1969; Pepperl and Falk 1979).

Krause (1969) has proposed two other phases for the Upper Republican variant, both which can be considered closely related to the Classic Republican phase. These are the Solomon River and Loup River phases. Krause has further proposed that a Nebraska variant, generally to the east of the Upper Republican variant, should be recognized which consists of the Doniphan and Douglas phases. He also believes that the Saint Helena phase is the product of influences from both the Nebraska and Upper Republican phases as well as from Oneota cultures.

It should be pointed out that there is considerable debate regarding Krause's interpretations (e.g. Lippincott 1978; Ludwickson 1978; Krause 1982; Blakeslee et al. 1982). For the purposes of this chapter, Krause's

concept of a Classic Republican phase of the Upper Republican variant has been retained. It can be assumed that these Classic Republican materials are related in many ways to the other Plains Village materials mentioned above, regardless of whether these groupings ultimately come to be recognized as aspects, variants, phases or subphases.

On a larger areal basis, links have been suggested between Upper Republican materials and Panhandle aspect manifestations on the Southern Plains (e.g. Baerreis and Bryson 1965) as well as to sites such as Arzberger within the Middle Missouri subarea (Spaulding 1956). Reher (1971) has reported the occurrence of Upper Republican ceramics as far west as southeastern Wyoming.

General Characteristics:

Krause (1969:90) summarizes some of the general characteristics of the Classic Republican phase:

> Settlements in this vicinity consist of lodge clusters and single house units strung out over almost every creek and river terrace (Wedel 1961:95; Strong 1935:69). Houses are square to square with rounded corners and typically have four or six center post superstructures. Clay plastered floors and walls, stone slab-lined floors, cashe pits with clay or stone slab linings and double entranceways are architechural elaborations reported for some sites (Strong 1935:76-81; Kivett 1961). Refuse dumps adjacent to lodge entrances and middens shared by the occupants of several lodges; incised antler and bone bracelets; and carved effigy pipes are yet other notable features of content (Strong 1935:85-89). As far as ceramics are concerned both outflaring cord roughened and incised collared rims are found. Although the portions of each rim type vary from site to site, collared incised rims seem to be the predominant form (Kivett 1961:22).

Falk (1969:102) has concluded the following regarding the use of local fauna by Upper Republican groups:

> In neither instance [i.e. the Nebraska variant Nuzum site nor the Upper Republican variant Mowry bluff site] is bison much in evidence, beyond the use of their bones for implements. Also, in each case, we have evidence of exploitation of the local habitat and its particular faunal (and floral) associations. This is

> particularily true at Mowry Bluff, where at least 35 faunal species were identified. Upper Republican peoples seem to have utilized a variety of micro-environments within the immediate site areas: stream bottoms and floodplains, wooded stream banks and stream valleys and marginal prairie areas.

Unlike the importance of horticulture in the Plains Woodland tradition, there seems to be little doubt that the growing of cultigens was an important aspect of subsistence for all groups in the Central Plains tradition, including the Upper Republican variant. As Krause (1969:89) states: "Bison scapula hoes, shelled maize, burned beans and squash remains are direct evidence of the cultivation of river bottom farm plots."

Burial Practices:

Wedel (1961:96) presents a summary of the burial practices of the Upper Republican groups which corresponds with what is known for the Classic Republican phase:

> Among the Upper Republican peoples, the corpse seems to have been exposed for a time and the dismembered bones subsequently placed in large communal pits situated on the bluffs overlooking the village sites. Broken pottery identifiable with the wares found in the village sites is sometimes present, as are small numbers of shell disk beads, pendants, and occasional chipped-stone artifacts. Such ossuaries have been examined along the Republican Valley, and others are known in the Loup River drainage to the north. They somewhat resemble the ossuaries of the earlier Keith focus Woodland groups of the same region; but unlike the latter, the Upper Republican ossuaries never contain the great numbers of shell disk beads and the triangular shell pendants characteristic of the earlier burials. From one burial site have been recovered small wooden disks covered with sheet copper, presumably obtained from contemporary peoples to the east.

Late Prehistoric Hunter-Gatherer Tradition

Age:

Wedel (1961:101) places a time range of from A.D. 500 to A.D. 1400. It seems likely, however, that bands of non-equestrian hunter-gatherers may have been present in the Central Plains well into the protohistoric.

Location and Associations:

Late Prehistoric hunter-gatherer groups are known to have been present in all of the Great Plains area. The interrelationships of these groups with first the Plains Woodland tradition and later with the Plains Village tradition are quite complex and probably changed in character quite often.

General Characteristics:

The hallmark of the Late Prehistoric hunter-gatherer tradition is the appearance of the bow and arrow and the resultant reduction in the size of the projectile points. Other than this change in weaponry it is possible that many aspects of the subsistence patterns remained very similar to what they had been in the Late Plains Archaic.

Some Late Prehistoric groups also utilized various types of ceramic wares. Because of this, the distinction between "true" nomadic groups and the nonvillage sites of Plains Woodland and/or Plains Village groups is quite vague and often arbitrary. Wedel (1961:101-102) has commented on this problem:

> The character of the native occupations of the western part of the Central Plains in late prehistoric times, say between A.D. 500 and 1400, still awaits investigation and clarification. It should be an interesting study in human ecology in a region that has been somewhat uncritically regarded for years as a most uninviting one for non-horse using peoples. I know of no published evidence, for example, that the creeks draining the High Plains and Colorado Piedmont of eastern Colorado have been carefully examined in recent years...Yet, as Renaud's surveys in the early 1930's first clearly showed, there are many sites in the region which apparently represent both pottery-making and nonpottery peoples....
>
> Until more of this westerly material has been collected, analyzed, and published in detail, it is impossible to judge to what extent these sites represent seasonal hunting stations used over a period of several or many years by people normally residing farther east or, alternatively, were semipermanent settlements where some small scale crop-raising may have been attempted. It is conceivable, too, that some of these locations mark the passage of people

> formerly relying in part on corn-growing farther east but here attempting the transition from a food-producing to a primarily bison-hunting Plains subsistence economy.

The skin tipi was used by many if not all of the Late Prehistoric Plains hunter-gatherers. In many places, the use of these structures has left archaeological features known variously as stone circles or tipi rings. In the Central Plains subarea these features have been found as far east as the bluffs of the Missouri River in northeastern Kansas (e.g. Wedel 1959:101). Much of the rock art present in the western portion of the Central Plains is probably also attributable to these groups.

Burial Practices:

It is surprising that there are so few burials which can be either directly or indirectly associated with Late Prehistoric period hunter-gatherer groups in the Central Plains. It seems likely that some of the cairn burials mentioned by Strong (1935) and Wedel (1959) may be related to this tradition. Because of the likely interrelationships between nomadic hunter-gather groups and other, better documented, manifestations in the Central Plains, no clearcut pattern seems evident. It is reasonable to assume that any or all of the burial patterns practiced by Late Plains Archaic, Plains Woodland, Plains Village, Dismal River and the protohistoric equestrian nomads may have been utilized by Late Prehistoric hunter-gatherers. The Late Prehistoric rockshelter burials of the Northwestern Plains (e.g. Snodgrass 1958) seem somewhat unrelated to this problem since such rockshelters are much less common in the Central Plains and do not seem to contain Late Prehistoric burials (e.g. Champe 1946).

Although the description is quite brief, the Late Prehistoric burials described by Strong (1935:228) may relate to this tradition:

> Below the sod line no historic material was encountered. This top 1 1/2 feet, comprising level III of prehistoric occupation, is not

very clearly marked and gives evidence of sporadic rather than continuous occupation. Several fireplaces and a number of small storage pits containing a few potsherds and artifacts were encountered. One such pit contained the skull of a wolf and the mandible of a child. Several partial bundle burials in small slab-lined cists, a few flexed child burials, and one complete skeleton of an adult male seated on a large rock were encountered in level III.

Plains Village Tradition
Central Plains Coalescent (Subareal) Tradition

Age:

Grange (1968:12) believes that the protohistoric and historic Lower Loup and Pawnee sites (to the northeast of the study area) range in age from approximately A.D. 1100 to A.D. 1750 or 1800.

Location and Associations:

The closest known Coalescent tradition sites to the study area are the Lower Loup and Pawnee sites just mentioned. These sites are most numerous along the banks of the Platte and Loup rivers near their confluence (Wedel 1938).

Although no Coalescent materials are known from the Harlan County Lake area, the occurrence of these materials just to the east seems to indicate that they may be relevant to the present study. While the material presented here concerns mainly the Coalescent tradition materials from the Loess Plains region, similar manifestations are known from much of the eastern portion of the Central Plains and the Middle Missouri (e.g. Lehmer 1971) subareas. It also seems likely that certain late Plains Village manifestations in the Southern Plains (e.g. Lintz 1978) and in the Northwestern Plains (e.g. Mulloy 1942; Byrne 1973) might be considered as Coalescent in character.

General Characteristics:

It is difficult to determine the proper taxonomic classification of Coalescent materials which occur in the Central Plains subarea. Since the Coalescent is considered as part of the area-wide Plains Village tradition (Lehmer 1971:32-33) and since, as originally described, it is believed to be derived from influences of both the Middle Missouri (subareal) tradition and the and Central Plains (subareal) tradition, it seems logical to refer to the Coalescent materials from Central Plains subarea as "the Central Plains Coalescent (subareal) tradition." Such a lengthy term is believed necessary in order to distinguish these materials from the more universally accepted concept of a Coalescent tradition in the Middle Missouri subarea.

Wedel (1961:108-110) describes many of the characteristics of the Coalescent Lower Loup and Pawnee:

> These sites range in area from less the fifteen to more than one hundred acres, and most are on elevated terraces or on the bluffs bordering stream valleys. In the early days of white settlement, house rings and refuse mounds without number abounded in this stretch; and broken pottery, animal bones, and other vestiges of human industry littered the ground surface....[The Lower Loup communities] consisted of numerous medium to large earth lodges from twenty-five to fifty feet in diameter, always circular in plan, and with the floor one to two feet below the ground surface....
>
> At some sites faint traces of defensive works such as earth walls and ditches are still visible, or have been revealed by excavation. In many cases, however, the houses were scattered over such a large area that fortification was impractical or else was considered unnecessary because of the strength of the available defending force....
>
> The abundance and size of cache pits suggests a highly productive crop-growing economy and considerable crop surpluses to be cared for. Milling stones for grinding corn are less plentiful than in the Great Bend sites, suggesting that wooden mortars and pestles may have been known. There is no indication of fishing, but hunting with the bow and flint- or bone-tipped arrow was extensively practiced.

A general summary of the ceramics of these groups is presented by Grange (1968:44-46):

> Most Pawnee and Lower Loup pottery is made of a fine to medium textured flaky paste sparsely tempered with crushed granite or sand. Other tempering materials observed include calcite, crushed limestone and mica...
>
> All of the pottery was produced by the same techniques of manufacture. Vessels were modeled from lumps of clay with no evidence of coiling observed....Cord Roughening...is present as a part of the complex, but is rare....Sherds which exhibit a somewhat complex pattern of surface treatment have been designated Check Stamped....These are rare in Pawnee and Lower Loup collections but must be regarded as part of the complex....Sherds with a Smoothed...surface finish were also frequently observed....
>
> Handles were attached to the vessels by welding them to the wet surface....Other appendages such as lugs and pendant tabs were modeled.
>
> Decoration was accomplished by incising or trailing the still wet clay with a pointed or blunt tool....Tool impressing or indenting and punctating were also common decorative techniques.

Grange (1968) goes on to describe a number of collared, braced and non-collared rim forms which occur in Pawnee and Loup River assemblages.

Burial Practices:

There are few good descriptions of Coalescent burials in the Central Plains. Strong (1935:58) provides a brief description of protohistoric and historic Pawnee burials from the Loup River Valley of east central Nebraska:

> Pawnee burials of this period are single inhumations, usually flexed, grouped on high hills near the villages. Gifts of various sorts occur with the bodies and they are often wrapped in reed matting. Caucasian artifacts, such as metal containers, reworked iron hoes, bridle bits, gun barrels, rifle balls, knife blades, scrap metal, and a little glass occur in house sites, cache pits, and burials in association with pottery and aboriginal artifacts.

Strong (1935:61) also mentions the presence of wooden bowls, platters and cradle boards in the protohistoric and historic Pawnee burials. Strong's summarizations were extracted from Wedel's "An introduction to Pawnee archeology," later printed in 1936.

Plains Athabascan Tradition
Dismal River Phase

Age:

All indications are that sites of the Dismal River phase date within 50 years of A.D. 1700 (Gunnerson 1960).

Location and Affiliations:

The core area for the Dismal River phase is in western Kansas and Nebraska and eastern Colorado (Wedel 1961). The northern extent of Dismal River materials may be in the vicinity of the Black Hills of western South Dakota and northeastern Wyoming (Gunnerson 1960; Reher and Frison 1980).

There is good evidence to indicate that Dismal River archaeological remains are Plains Apache in origin (e.g. Gunnerson 1969). For this reason, many comparisons have been drawn between the Dismal River materials in the Plains and features found in the Southwest such as the pueblo at Pecos, New Mexico (Gunnerson 1956; Wedel 1961).

General Characteristics:

One of the most extensively studied Dismal River manifestations in Nebraska is White Cat Village, 25HN37 (Champe 1949; Gunnerson 1950, 1960). From the evidence at this and other sites in the Plains area, Gunnerson (1960:245-248) has summarized the general characteristics of the Dismal River phase:

> The Dismal River people had a subsistence economy based primarily on hunting and secondarily on agriculture. Bison appears to have been the chief animal hunted, although numerous deer and beaver bones are also found....
>
> Evidence of agriculture is present but limited. Bison-scapula digging tools, which were probably used for cultivation of crops, have been found in several sites, and at 14SC1 [the Scott County State Park pueblo site in western Kansas] there are irrigation ditches possibly attributable to the Dismal River occupation.

More direct evidence of agriculture is present in the form of the charred remains of corn, and squash or gourd....

Dismal River pottery is the artifact most diagnostic of the Dismal River Aspect. Single sherds from other complexes could be confused with Dismal River pottery, but there is little chance for confusion between series of Dismal River sherds and pottery from any other identified complex in the Central Plains. The most diagnostic traits of Dismal River pottery are its gray-black color, smooth or simple stamped surface, gritty paste, tendency toward straight square breaks, small sherd size, tempering (usually fine to medium sand or occasionally mica) and scarcity of decoration, which, when present, is almost always confined to the lips and consists of punctates and incised or impressed lines....The vessels [from 25CH1] are globular to somewhat elongated with a constricted neck. The rims are straight or flaring and meet the body of the vessel in a smooth curve....

Tools used by the Dismal River people were limited in variety and, for the most part, were of types used by other Plains groups. Chipped-stone projectile points were small, triangular, and well made, with and without side notches....

Since the most common house type at White Cat Village is also found at the Lovitt Site, it seems justifiable to consider the typical Dismal River lodge as semipermanent, about 25 feet in diameter, probably with a covering of grass or brush over a 5-post foundation plus leaners, and built either on the surface of the ground or in a shallow excavation.

Burial Practices:

Gunnerson (1969:46-48) has reported on a burial from Scott County, Kansas which may be Dismal River/Plains Apache:

The skeleton had been found in a pit whose walls had been burned prior to the interment of the body, and...the fill included some ash and charcoal. The bottom of the pit, according to Mr. Norman, was about three feet below the original surface of the ground...A large flat stone was found above the skeleton.

The baking pit that contained the skeleton described in this paper can be assigned to an extensive Plains Apache occupation represented by Dismal River archaeological remains found here and there in the valley of Ladder Creek (locally called Beaver Creek), both north and south of the seven-room pueblo ruin described by Williston and Martin (1900) and Wedel (1959:424-6). Champe (1949) has identified this ruin and the Dismal River remains around it with the site from which Ulibarri recovered pueblo refugees in 1706, and hence also as a village of the Cuartelejo Apaches, with whom these people were living....

> Since the baking pit that contained the skeleton was at an Apache site, it was undoubtedly of Apache authorship. The ethnic affiliation of the skeleton itself is probably more open to question. Since no other burial even suspected of being Plains Apache has been found, we do not know how these people disposed of their dead at ca. 1700. If the general attitude shown by the Southern Athabascans toward their dead in recent times prevailed then, however, burial in a village would seem highly unlikely unless the village was to be immediately and permanently abandoned....
>
> From the photographs of the Kansas skeleton, it can be noted that the individual had been buried tightly flexed on his right side, his head to the north and facing west.....The skeleton is fairly complete and well preserved....The skeleton is here identified as that of a male, about 22 or 23 years old and about 170 cm. (5 ft. 7 in.) tall.

Other than the large flat stone just mentioned, no other grave goods were apparently found in the burial.

Equestrian Nomadic Tradition

Age:

Plains groups probably first began to acquire the horse sometime during the first quarter of the eighteenth century. The Equestrian Nomadic tradition can be considered to have lasted up until the final settlement of Plains Native American groups on reservations. Many writers consider this final settlement to have been completed at the time of the killing of Big Foot's Minneconjou band at Wounded Knee Creek, South Dakota in 1890.

Location and Associations:

Horse-mounted bison hunters are known to have occupied the entire Great Plains area. Those ethnic and/or tribal groups who are likely to have been present in the vicinity of the study area include the Cheyenne, Arapaho, Teton Dakota and Comanche (Strong 1935:9, Fig. 2).

General Characteristics:

Wedel (1961:242) presents a brief but very useful description of the horse nomads of the Plains:

> The way of life followed by these people is so well known that we need only outline it briefly here. Generally considered the "typical" Plains tribes, all were nomadic in the sense that they could move readily from place to place without loss of homes or other belongings. All possessed horses, made frequent and exclusive use of the skin tipi, the travois, and the parfleche, and were skilled in skin-working. During the spring, summer, and fall, they ranged widely over the Plains, transporting themselves and their baggage by horse and dog, sustaining themselves on the flesh of bison, and drying large quantities of meat for winter use. Hunting practices included such co-operative devices as the surround, the pound, and the use of falls or "jumps." With the approach of cold weather, they retired to the protection of wooded valley bottoms, or to broken, hilly, or mountainous localities where shelter, wood, water, and forage for their horses were available. Since agriculture was absent, pottery-making of negligible importance, and residence changed frequently, there is little or nothing at their former camp sites from which the archaeologist can hope to learn much about the people.

Burial Practices:

There was no doubt a great deal of variability in the burial practices of the various historic Plains groups. Frison (1978:421) makes the following observations concerning historic Native American burials in the Northwestern Plains subarea:

> Burials of the historic period are quite obvious, since the dead were placed in trees..., on scaffolds, in rock crevices, under rock piles, or in shallow graves. Such burials often contained grave offerings...Also a common feature in the Late Prehistoric and protohistoric periods was the secondary burial. Here the body was exposed in a tree or on a scaffold for varying periods of time, then what remained was interred in a shallow grave. Usually much was lost and the bundle burial often contained only a small part of the skeleton.

Johnson (1965:376) gives further details on the burial practices of the Teton:

> Burial took place in the open. The corpse was wrapped tightly in a robe with his or her personal pipe, medicines, and weapons or tools. It was then placed on a scaffold or platform erected outside the village, or it was laid in a tree. In the late

nineteenth century, there are evidences that a favorite horse was sometimes killed and placed beneath the scaffold. Food and other small offering were placed beneath the scaffold burial. In former times, the Teton, along with the other Dakota tribes, undoubtedly practiced inhumation in an earth mound, although such inhumation took place after the original exposed burial. The secondary mound burial involved collection of the bones which were then grouped into a small bundle and buried without any accompanying grave goods. On the Plains, the Teton abandoned the secondary burial and used only the scaffold type.

CHAPTER FOUR

SITE DESCRIPTION

Physical Characteristics

Archaeological site 25HN118 is located along the western shore of Methodist Cove (Figure 4.1). The site was originally reported by Roetzel (1982:46):

> Although the artifacts recovered from the site are relatively scarce, it has been classified as a habitation site because of the ceramic sherd and the tool that were recovered, in addition to the burials of at least three individuals....The site yielded artifactual material along the cutbank and 10 meters onto the beach....Analysis of the recovered cultural materials did not allow a determination of cultural affiliation to be made.

The osteological material was observed within a one meter area along a small "beach step (15-20 cm.) at an elevation of 1935 m.s.l. and were found at a depth of 5-20 ~ from the surface" (Roetzel 1982:47). This beach step is located approximately 35 meters east of the observed cultural materials. No feature, such as a mound, was observed at site 25HN118 (Ellen Cummings, personal communication).

One of the shovel tests placed in the vicinity of the exposed bone revealed buried osteological materials. Subsequently, the area containing buried osteological materials was partially excavated by Corps of Engineers personnel during the first week of December, 1980.

During the Corps of Engineers' investigations of 25HN118, additional osteological remains were observed along a vertical cutbank of Harlan County Lake. This area of osteological remains, designated 25HN174, is located approximately one-half mile southeast of site 25HN118 (see Figure

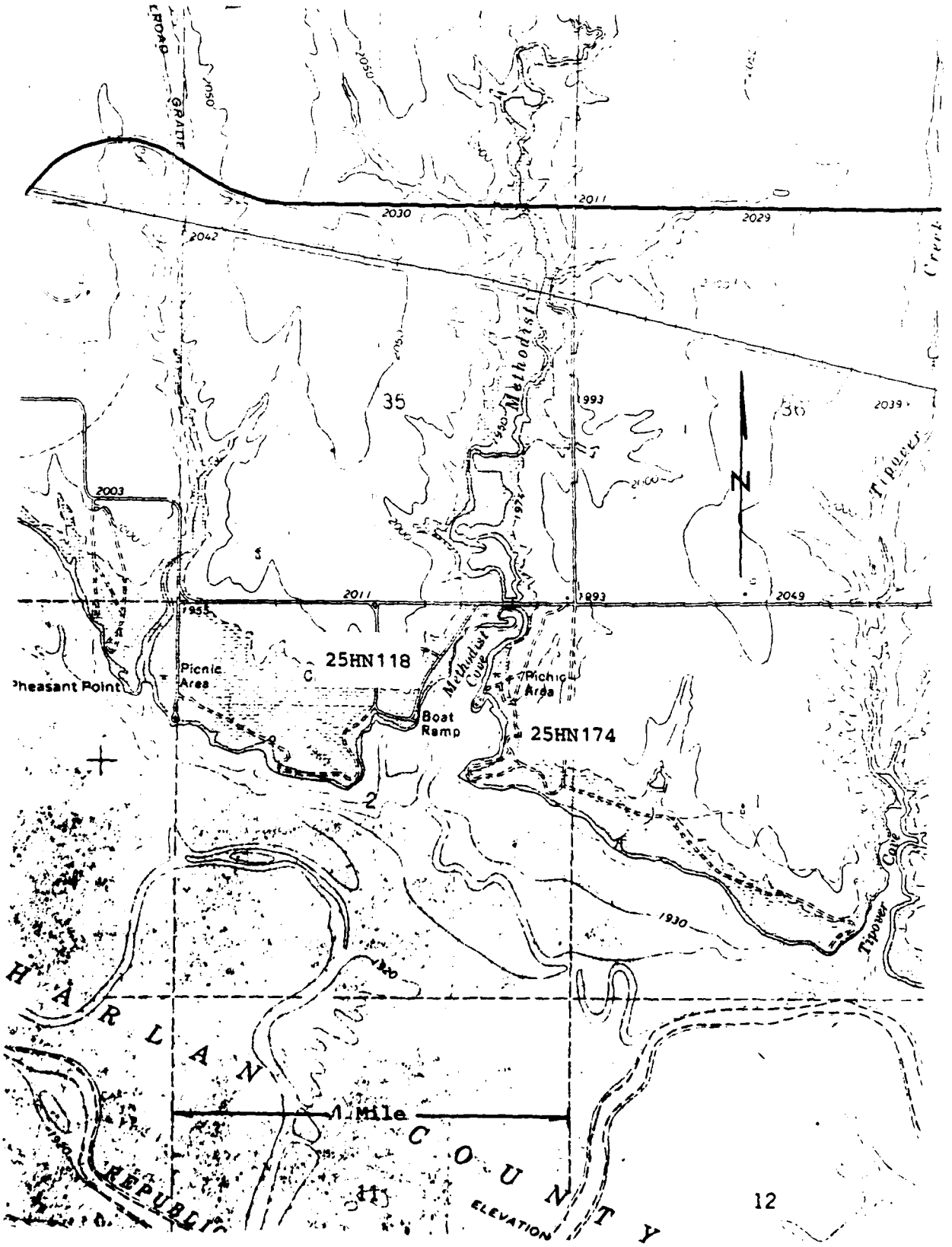


Figure 4.1. Location of sites 25HN118 and 25HN174. Map compiled from U.S.G.S. topographic series, 7.5' Alma Quadrangle.

4.1). Additional excavation of site 25HN174 was conducted by Corps of Engineers personnel during the middle of November, 1981. The remains of one individual were recovered.

Both the 1980 and 1981 excavations were hastened by unfavorable weather conditions. In the instance of site 25HN118, excavation was further compounded by periodically frozen, water saturated soil and the likelihood that the level of Harlan County Lake would again inundate the site area. As previously stated, osteological material was initially observed at 25HN118. This material was located within a small area and no feature (mound) was present. It was originally believed that the osteological material represented several isolated bone fragments which may have been in secondary deposits. Therefore, the primary purpose of the 1980 excavations conducted at 25HN118 was to determine the nature of osteological materials present (Ellen Cummings, personal communication). The purpose of the 1981 excavation was to remove the individual burial at 25HN174.

The Archaeological Data Base

The following section discusses the types of archaeological data recorded from sites 25HN118 and 25HN174. This discussion is important in order to understand the limitations of the inferences which can be drawn.

In the instance of site 25HN118, accurate provenience information and information concerning the orientation of the osteological materials is not available. This is perhaps due to the nature of preliminary excavations conducted at the site (see above). The excavation notes include sketch maps showing seven contiguous "excavation squares". No scale is provided, however. The only provenience information recorded for any of the materials is the square number from which the element was recovered. Only five of the seven excavation squares are referred to in this manner. It is

therefore difficult to state the degree of articulation represented, to accurately determine the distribution of elements or whether the individuals represent extended, flexed, semi-flexed or bundle burials.

As previously stated, no information is available on the size of the squares excavated. Squares 1, 2 and 3 appear to be of equal size and are the largest. The majority of osteological materials was recovered from these three squares. The remaining squares are smaller but their exact size is unknown. The provenience recorded by the excavators (listed by square number on the various sacks containing osteological material) includes the following: surface, squares 1, 2, and 3; square north of square 2 and square west of square 1. The list of osteological materials in Appendix A of this report includes this provenience information under the heading of SQ (square) with square A0 corresponding to surface, A1 to square 1, A2 to square 2, A3 to square 3, A4 to square north of square 2, A5 to the square west of square 1 and A6 to unknown provenience.

The maximum depth of excavation indicated for site 25HN118 is ten inches. The majority of material appears to have been recovered from a depth of one and one-half to five inches. Although no profile of the excavation squares is available, soil description in the excavation notes indicates that the soil was clayey with several rodent disturbances evident. It is not known what percentage of the burial area was excavated. However, it appears that additional osteological remains are still present (Ellen Cummings, personal communication).

In the case of site 25HN174, only one unit was excavated to a depth of approximately four feet. This excavation unit was positioned adjacent to the cutbank of Harlan County Lake. The information available from 25HN174 includes several photos showing the excavated burial. A soil profile sketch, a photograph of the cutbank before excavation and a photograph of a

wall of the excavation square are also available. While it is possible to determine at what depth below present-day ground surface the individual was recovered, it is not possible to conclusively state whether or not this individual was placed within any type of feature such as a burial pit.

With the above noted qualifications in mind, it is believed that the recovered osteological material differs between sites 25HN118 and 25HN174 in terms of burial practices, morphology, and, as suggested by our findings, cultural affiliation. The following discussion describes the cultural materials and osteological remains recovered from sites 25HN118 and 25HN174.

CHAPTER FIVE

CULTURAL MATERIAL

Very little cultural material was found in association with the burials at sites 25HN118 and 25HN174. Following is a description of the cultural material recovered.

25HN118

Two bone awls, two bifaces and three fresh-water shells were found during the excavation of osteological material at 25HN118.

Fresh-water shells:

Three fresh-water mussel shells were recovered, none of which have been modified. One small fresh-water mussel was recovered from Square A-3 at a depth between one and one-half and three inches. It is not known whether this shell is related to the burials or occurred as a result of inundation by the Harlan County Lake. Two other fresh-water shells were recovered from 25HN118. The larger of these two shells, Lampsilis cf. ovata ventricosa (Barnes, 1832), was surrounded by a large amount of soil matrix. Removal of this soil revealed a brown chert biface and two bone awls contained within the shell (Figure 5.1). Although, sketch maps include both of the latter two shells, no distinction between them is made and it is impossible to accurately determine the provenience of the larger shell which contained the additional artifacts.

Figure 5.1. Bone awls and bifaces in association with fresh-water shell; 25HN118.

Bifaces:

Two bifaces were recovered from site 25HN118. One of these was recovered from Square A-3 at a depth from three to eight inches below surface. This brown chert biface (Figure 5.2a) exhibits wide, flat flake scars on one face with relatively steep, small retouch on the opposite face giving the artifact a plano-convex cross section. The unifacial retouch is suggestive of a cutting or scraping function. The artifact is 53 millimeters long, 27 millimeters wide and 12 millimeters thick. This biface occurred within the same level as the human remains.

The other biface was associated with the fresh-water shell. It is 62 millimeters long, 38 millimeters wide and 19 millimeters thick. The specimen (Figure 5.2b) exhibits wide, flat and deep flake scars across both surfaces. Cortex is present on one surface while the other surface exhibits numerous step fractures along both lateral margins. This biface is plano-convex in cross section and is made of the same raw material as the previously described artifact.

Bone awls:

In addition to the above described biface, two bone awls were associated with the fresh-water shell. One of these (Figure 5.2c) measures 101 millimeters in length and 16 millimeters in width. The proximal end of this specimen exhibits the articular surface of a deer or antelope tarsal which was split lengthwise. A series of parallel incised lines form a "V" on the exterior surface of the bone.

The other bone awl (Figure 5.2d) appears to have been manufactured from a split metatarsal and retains the proximal articular surface. The distal end of this specimen is quite rounded. This artifact is 23 millimeters wide, 61 millimeters long and 12 millimeters thick.

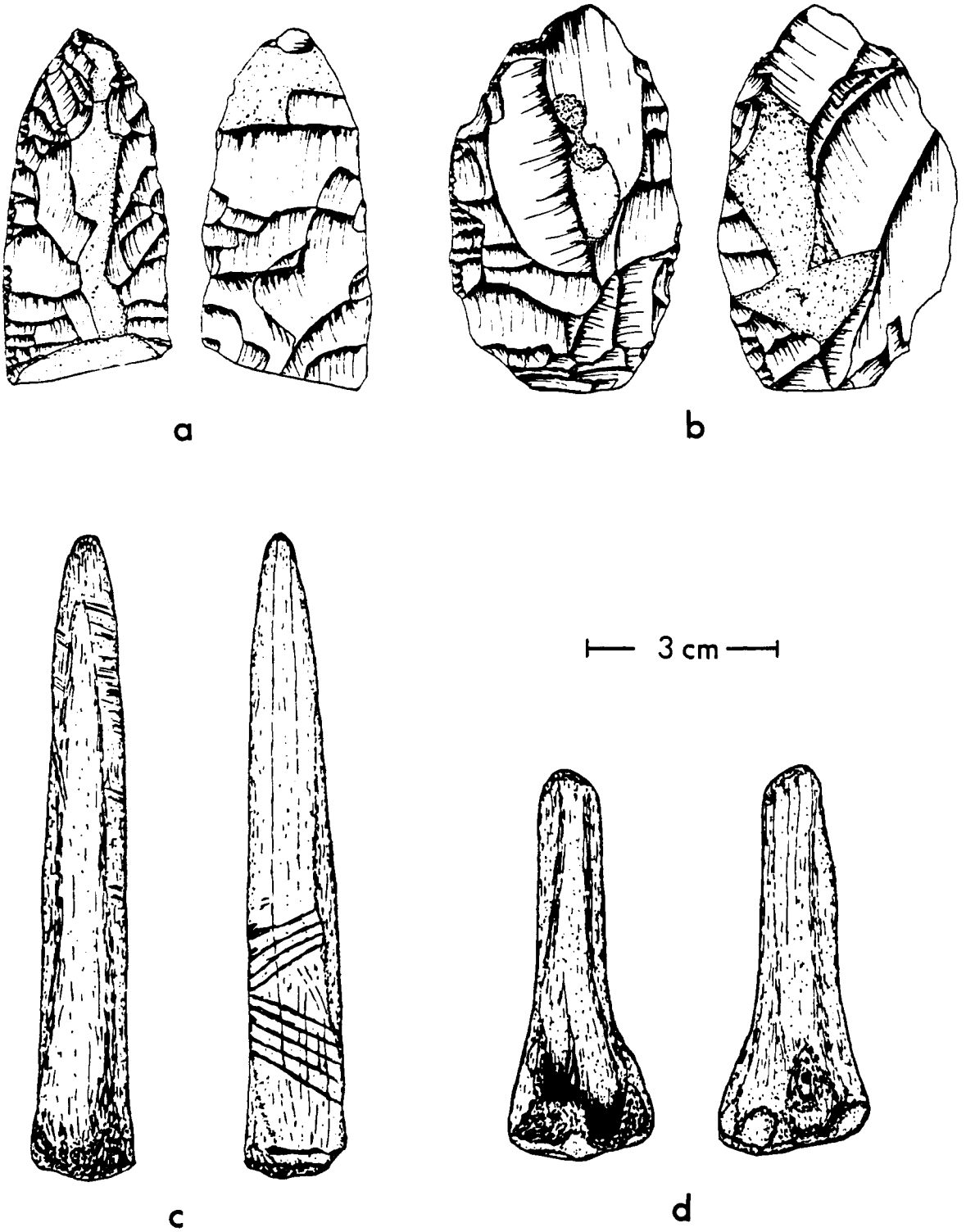


Figure 5.2. Bifaces and bone awls recovered from 25HN118.

25HN174

One tan chert tertiary flake was recovered during excavations at 25HN174. This flake was located approximately 20 inches below the surface. It is not known if this flake was associated with the burial. However this seems unlikely since the flake was recovered approximately 30 inches above the osteological material.

CHAPTER SIX

ALTERATIONS TO THE OSTEOLOGICAL REMAINS

In order to make any meaningful observations regarding human behavior, it is necessary to first determine which properties of the archaeological record are in fact due to the action of man and which are diagnostic of nonhuman action (e.g. Binford 1981). Since we are dealing with osteological material, the morphological properties to be considered relate to surficial modifications and breakage patterns exhibited on the bone. The following segments describe the condition of the osteological materials, discuss the variations noted (primarily the long bones) and attempt to determine the probable causes for this variation.

25HN118

Initial examination of the osteological materials from 25HN118 indicated that they were highly fragmentary and that metric observations would be impractical (Tibesar 1983). Further analyses of the materials demonstrates that, while many of the elements are fragmentary, reconstruction and metric observations for many of the long bones are possible.

Post-depositional processes have, to a large extent, altered the appearance of the osteological materials. They have been subjected to periodic inundation since the completion of the Harlan County Lake. Although it is not possible to fully quantify the effects of this periodic inundation, it can be stated that preservation of the materials, with the possible exception of the long bones, is poor.

The organic staining is one of the most obvious changes which can be attributed in some degree to the effects of inundation. Bone coloration, which was somewhat helpful in grouping elements according to an individual, also indicates that some of the breakage and gnawing must have occurred after the elements achieved their present color. The bone, which is typically a dark brown in color, contrasts markedly with the light brown color of recent breakage and gnawing marks.

No cut marks are present on any of the remains and none of the bone appears to have been subjected to fire. Minor etching (Binford 1981:49-51) of the bone surface caused by plant roots is evident on many of the elements.

While the preservation of the majority of the long bones is relatively good, articular ends are less well preserved and many of the diaphyses are broken. This patterning could be explained by: 1) the effects of predator-scavengers, 2) differences in the construction of the various bone elements, or 3) the effects of man.

In assessing the effects which predator-scavengers may have had on the remains, the work of Binford (1981) has been used. Binford's data have also been supplemented by the Principal Investigator's personnel observations of large amounts of faunal materials recovered in an archaeological context (see attached Vita).

Post-mortem surficial bone scoring (Binford 1981:46) is present on several elements but is relatively infrequent. No punctures or associated crenulated edges are apparent nor is there any pitting of the bone (Binford 1981:44-46). Scoring is evident on one left ilium fragment, the right ulna, both tibiae and femora of Individual 25HN118-2. The left tibia of Individual 25HN118-2, which exhibits the most severe scoring, was recovered

from the surface. The provenience of the right tibia and femora is unknown. The right ulna and left ilium are the only specimens actually known to have been recovered from excavation which exhibit scoring.

The scoring exhibited by these six specimens is very sharp and the marks are close together. Scoring of the long bones is transverse to the long axis of the bone. These factors suggest rodent rather than carnivor gnawing. Also, the scored areas do not have the dark brown staining evident on the remainder of the bone. This suggests that the gnawing is relatively recent.

The destruction of many of the articular ends could be mistaken for what Binford (1981:48) terms furrowing:

> Furrowing is a term I have adopted...to refer to the effect that repeated jaw action with either canines or carnassials produces on relatively cancellous bone tissue....This is by far the most common type of damage produced by animals and is the type that is present even if animals have given only minor attention to the remains under investigation.

If this destruction of the articular ends is due to the effects of carnivores, than the cancellous portion and the entire articular surface would have been consumed. However, in several instances, the cancellous portion of the bone and articular surface assumed to be missing was, in fact, present in the collection and reconstruction was possible. Also, no pitting, flaking or polishing of the ends of the long bone shafts is apparent.

Breakage of the long bones is typically transverse to the long axis of the bone. Although several channeled bone breaks (Binford 1981:51) might be suggested, in nearly all instances these bones were reconstructed from large (greater than 5 centimeters) and small fragments present in the collection. If the breakage was the result of carnivore activity, the small fragments would most likely have been swallowed by the carnivore

"resulting in few chips and small bone fragments remaining" (Binford 1981:58). We would also expect to find evidence of gnawing, such as flaking, scoring, pitting or abrasion, along the edges of the larger chips or channeled bone and the exposed edges of the break should be of the same coloration as the remainder of the bone. This is not the case. The breaks are very sharp and exhibit no step fractures, flaking, pitting or polishing. The exposed cross-section of the bone is usually light brown in color when compared to the darker brown outer surface of the bone.

Based on the overall appearance of the bone and the fact that, in many instances, nearly total reconstruction of the long bones was possible, it is suggested that the actions of predator-scavenger resulted in only minor modification of the bone. It is further suggested that most of the breakage and gnawing is relatively recent, occurring sometime after the bone achieved its present color.

Bone breakage and fracture is perhaps due to recent animal trampling and the effects of alternate freezing and thawing. This would explain why few of the channeled breaks exhibit any gnawing and why many of the smaller channel fragments and articular ends of long bones are still present within the collection. Since these materials were recovered from the surface to a depth of less than 10 inches, such actions would have been more influential than if the bone had been buried to any substantial depth.

While the effects of trampling and/or freeze/thaw may have caused breakage of the long bones, this does not explain the differential preservation observed on many of the articular surfaces of the long bones. This patterned destruction could be due to variations in bone density and bulk. This would explain some of the differences between the preservation of the diaphysis and the articular surface of the bone but it does not

explain differences observed in the preservation of the same articular surfaces on different individual bones.

For example, destruction of the distal end of the femur is not uniform across the total assemblage. While one of the six specimens is nearly totally destroyed, two of the specimens exhibit minor erosion and two are extremely well preserved. Similar inconsistencies are present for the proximal portion of the femora and tibiae as well as the proximal and distal portions of the humeri. Patterning is apparent however in the destruction of the distal tibiae, fibulae, radii and ulnae as well as the total absence of the proximal fibulae.

Of the four radii recovered from 25HN118, the extreme distal articular surface (including the ulnar notch, capitulum of ulna and styloid process) is absent from two of the specimens while on the other two, the styloid process is missing. The proximal portion of three of the radii is complete with little or no destruction apparent. The fourth radius is broken at the midsection of the diaphysis and the proximal portion is missing.

A total of five ulnae are represented in the collection. The distal articular surface is missing on two of the specimens and the area immediately superior to the styloid process is eroded on two other specimens but the styloid process itself is intact. Only one of the five ulnae has a complete distal end. In considering the proximal portion of the five ulnae, three are complete and well preserved. The olecranon and portions of the semilunar notch and coronoid process are missing from two.

It is difficult to explain this patterning on the basis of natural deterioration of the articular ends. Because the distal end of the ulna is small and somewhat fragile, it may be more subject to destruction from natural causes than the proximal end. However, this does not explain why,

on two of the five specimens, deterioration of the distal portion is restricted to the area immediately superior to the styloid process. Also, while the distal portion of the ulna is small and fragile, so to is the fovea of capitulum which is preserved on all four of the proximal radii present. The proximal portions of the radii are, in fact, better represented than are the larger, distal portions. Of the two distal radii which have the articular surface present, the styloid process is absent on both. In other words, a pattern seems to emerge for the distal radius-ulna in which lateral portions of the radius and medial portions of the ulna are underrepresented.

It seems possible that the destruction of the distal radii-ulnae is the result of deliberate human disarticulation of the hand (Figure 6.1). Although no cut marks are present on any of the materials, cutting of these units for disarticulation would have been unnecessary. Since little connective tissue or muscle is present in this area of the human body, particularly if the body had been partially defleshed by exposure, these elements could have been easily chopped free. This would also explain why elements of the hand are missing or rare in the collection. Of interest is a statement made concerning human remains at the Crow Creek site (39BF11): "It is also possible that many more hands were taken by smashing the radius and ulna rather than attempting to cut though these bones" (Zimmerman et al. 1981).

The patterned destruction represented by the fibulae is even more consistent than that represented by the distal radii-ulnae. While the proximal portions of the fibulae are totally absent, on all of these specimens, the lateral surface of the distal ends, including the malleolus, is extremely deteriorated but the malleolar articulating facet itself is well preserved on three of the four specimens.

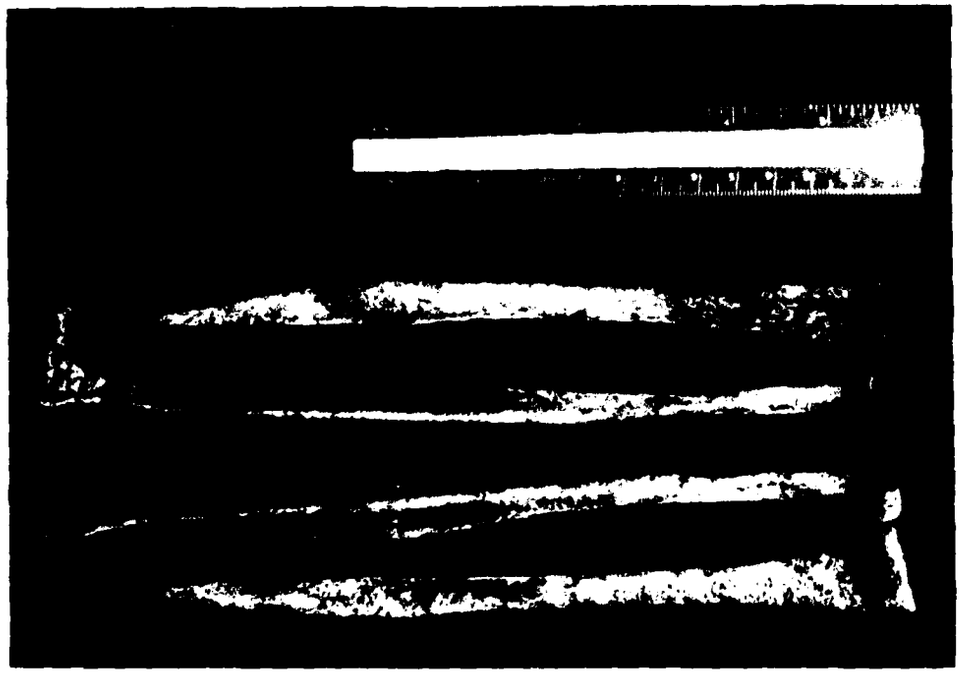


Figure 6.1. Radii-ulnae associated with Individual 25HN1[illegible]-1.

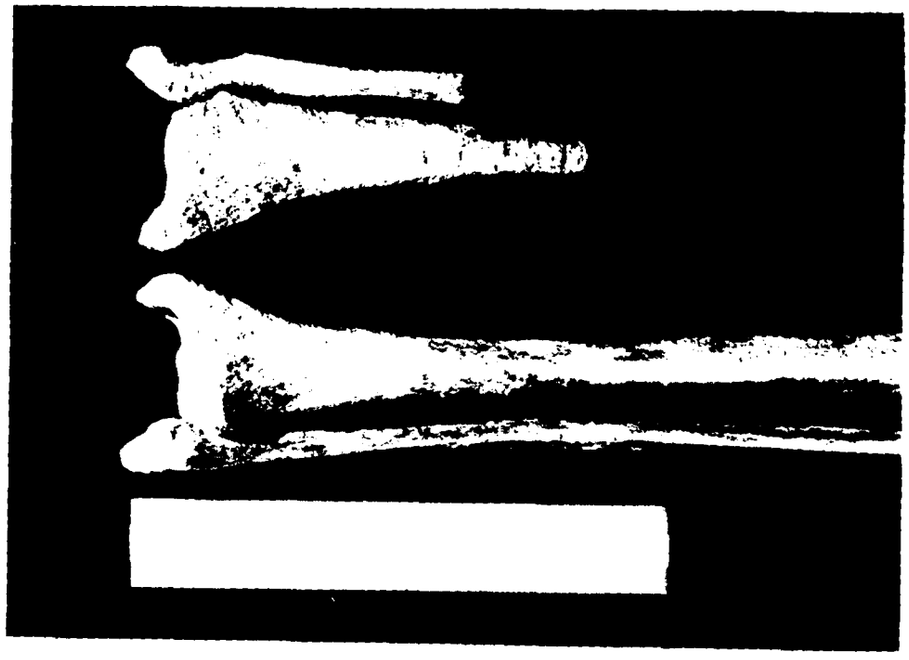
The distal portion of the tibiae are also poorly preserved. The two distal tibiae from Individual 25HN118-1 exhibit deterioration of the anterior surface while the posterior surface is well preserved. The two tibiae from Individual 25HN118-2 are missing the distal portion entirely. On the distal end of the tibiae from Individual 25HN118-3, the fibular articular surface and the area superior to the medial malleolus are poorly preserved. The patterned destruction of the distal tibiae-fibulae could be due to the deliberate disarticulation of the foot (Figure 6.2). This would also explain why elements of the foot are rare in the collection. A more detailed discussion of the frequencies of the various elements is presented in following portions of this report.

25HN174

Prior to stabilization, the osteological materials recovered from 25HN174 were extremely fragile. Although much of the bone, particularly the axial skeleton, is fragmentary, reconstruction of the skull and many of the long bones was possible.

The bone recovered from 25HN174 lacks the dark staining characteristic of the assemblage recovered from 25HN118. The material from site 25HN174 is typically buff colored and the exposed cross-sections from recent breakage is nearly white. Minor etching caused by plant roots (Binford 1981:49-51) is evident on the majority of the exterior bone surfaces. No cut marks are present and none of the material has been subjected to fire.

In assessing the condition of the material recovered from 25HN174, the terminology used by Binford (1981) has again been followed. No surficial tooth scarring, either in the form of punctures, pits, scores or furrows (Binford 1981:44) is present on any of the bone. Bone breakage, which is typically transverse to the long axis of the bone, appears to be related to



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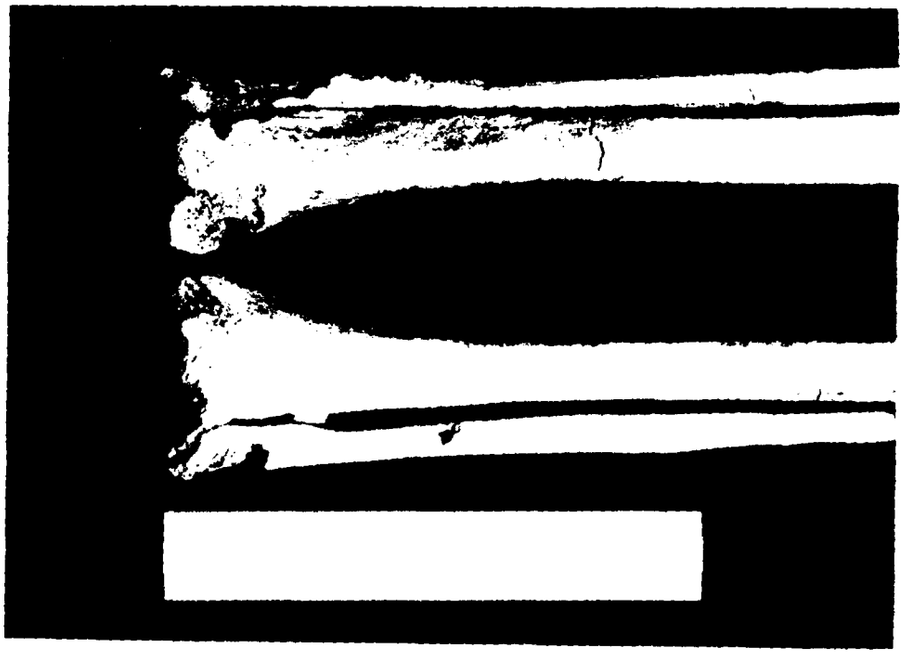


b

excavation procedures as evidenced by the available photos. The exposed cross-section of the broken bone is also much lighter in color, suggesting recent breakage. As is the case with 25HN118, the actions of predator-scavengers was minor and resulted in little significant alteration of the bone.

In comparing the osteological materials recovered from the two sites, the articular surfaces of the materials recovered from 25HN174 are generally more complete and show little indication of human modification. In those instances where portions of the articular surface are destroyed, the exposed cancellous bone is very light colored, suggesting very recent breakage.

CHAPTER SEVEN

OSTEOLOGICAL ANALYSIS

25HN118

Introduction:

The human skeletal remains recovered from site 25HN118 appear to represent the secondary burial of at least four individuals referred to as 25HN118-1, 25HN118-2, 25HN118-3 and 25HN118-4. Most of the skeletal material present, with the exception of the long bones, is in exceedingly poor, fragmentary condition. Osteological analysis was further complicated by the fact that each individual was apparently left to decompose elsewhere to the point of complete, or nearly complete, disarticulation before being deposited in their current resting place. This method of burial may also have resulted in a mixing of the skeletal components between individuals.

Our first task therefore, consisted of sorting out the various skeletal remains present in order to distinguish the number of individuals present; this job proved to be far more difficult than anticipated however. Due to the exceedingly warped and fragmentary condition of the cranial remains, attempts at reconstruction proved impossible. Subsequent analysis of the post-cranial remains (described more fully in the latter part of this chapter) indicate that three of the four individuals present are adult females. The remaining Individual, 25HN118-4, is an adolescent represented only by several fragmentary long bones. All skeletal material present appears to be in a similar state of preservation indicating that they were all interred at approximately the same point in time. Therefore, due to a

general paucity of diagnostic features and relative scarcity of cranial elements, any attempt to associate the various cranial remains with the long bones of a particular individual would have been totally arbitrary. Consequently, in light of our inability to associate cranial and post cranial remains with any degree of certainty, these different components of the human skeleton will be dealt with separately.

Post Cranial Remains:

As previously indicated, an examination of the post-cranial remains reveals the presence of at least four individuals. The more well preserved post-cranial remains were sorted according to individual based on several morphological characteristics. These features include the overall stature and robusticity of the individual; relative age at death; distinquishing pathologies; bilateral long bone lengths; and the ability of corresponding bones to articulate smoothly.

Despite the lack of complete crania, all individuals present are believed to be of Native American ancestry. This assessment has been based on the cultural aspects of the burial itself as well as diagnostic features of the dentition (discussed below). A metric technique used to detect difference in the degree of femoral platymeria between American Indian, Caucasian and Blacks, (Gilbert and Gill 1984) was applied to the complete femora of individuals 25HN118-1 and 25HN118-3. The results of this analysis placed the femora of both individuals within the American Indian category, thus supporting our earlier conclusion as to racial identity.

Of the four individuals present, three appear to be adult females of somewhat different stature and robusticity. One is an adolescent child who's age, based on long bone development, is approximately 12-13 years. Unfortunately, a great deal of the post-cranial remains are in such a poor

state of preservation that they could not be distinguished as belonging to any particular individual. However, a majority of the major long bones were either nearly complete or could be reconstructed to the point that individual morphological variation could be observed. Appendix A lists, by individual, the skeletal remains recovered from 25HN118.

The post-cranial remains of Individual 25HN118-1 consist of all the major long bones with the exception of the proximal portion of the right tibia. Other remains present consist of a nearly complete right ilium, a left patella, both calcanea and both tali.

The sex of Individual 25HN118-1 is clearly female as evidenced by a proximal femoral head measurement of 39 millimeters (Krogman 1962). Several diagnostic, non-metric traits of the post-cranial skeleton further support this assessment. Such traits include a broad sciatic notch, the presence of a distinct pre-auricular sulcus, the characteristic morphology of the sacro-iliac surface of the posterior ilium, and the overall small, gracile architecture of the post-cranial bones examined.

This individual was evidently an adult as indicated by the observed state of long bone development; terminal union of the proximal and distal epiphyses having obviously occurred a number of years before death.

Stature has been calculated for this and all individuals within this study using the Trotter and Gleser (1958) formulae for white females. Individual 25HN118-1 had attained a stature of approximately 5 feet 1 inch (155.9 ± 3.55 cm.) as calculated using the maximum length measurements of the left femur and tibia. There is a distinct possibility, however, that stature at time of death was somewhat shorter, possibly by as much as several centimeters, depending on the age of this person at death. (Dental remains, discussed more fully in subsequent portions of this chapter,

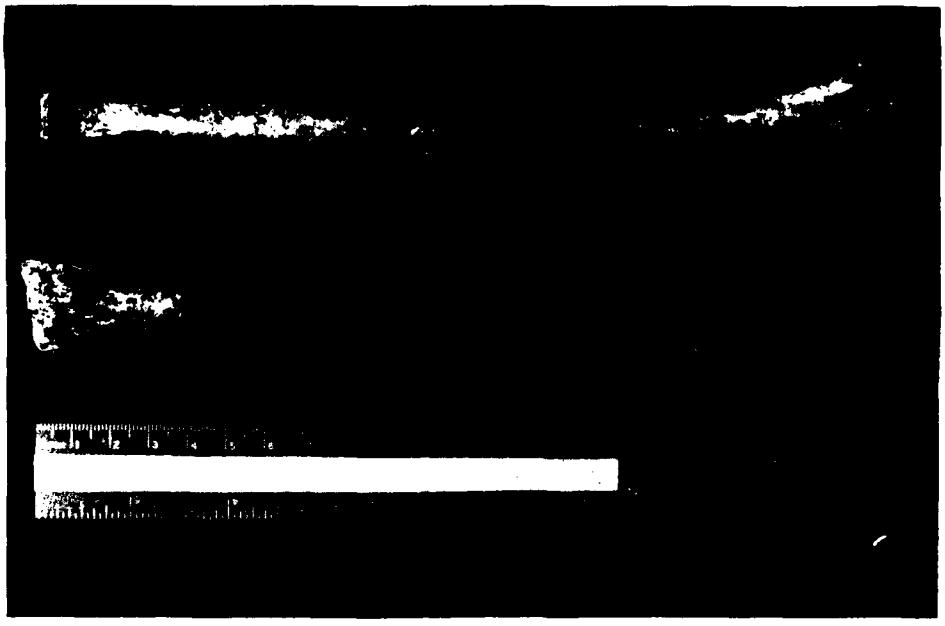
indicate that two of the three individuals present were over 50 years of age).

No obvious pathologies were observed in any of the skeletal remains associated with this individual.

The post-cranial remains of Individual 25HN118-2 consists of the proximal portion of both tibiae, a nearly complete left humerus, a fragment of right femoral shaft, the distal portion of both fibulae, a complete left and a nearly complete right ulna, a portion of distal left radius and both patellae.

The sex of this individual was somewhat difficult to ascertain from the limited number of post-cranial remains present. While the long bones appear to be fairly robust with distinct muscular attachments, the olecranon fossa of the distal humerus is clearly perforated and the maximum depth of the intercondylar femoral notch is approximately 30 millimeters, a borderline measurement between male and female (Baker 1983). Consequently, this individual is either a fairly robust female or a smaller male. After careful scrutiny of the remains however, it is our conclusion that these remains represent a rather robust female. Although the long bones demonstrate what might be considered unusually large muscle attachments for a female, the stature, as calculated from the maximum length of the left ulna is only 5 feet 4 inches (164.1 ± 4.30 cm) which is possibly more indicative of a female than a male.

Several pathologies were observed on the post-cranial remains of this individual, both of which involved the lower arm bones. A noticeable thickening of the bone is present on the distal shaft of both the left radius and right ulna (Figure 7.1). Although first suspected of being the result of healed fractures, subsequent X-rays revealed no fracture lines in either location (Figure 7.2). Although the affected areas are unusually



large in diameter, the outer bone surfaces are smooth and do not demonstrate the porous or granular appearance characteristic of periosteal infections (e.g. Zimmerman et al. 1981). However, in light of the fact that no evidence of fracturing exists, it appears that some type of localized bone infection, quite possibly periostitis, was responsible.

The remains of Individual 25HN118-3 are also those of an adult female. The skeletal material present consists of both femora, both tibiae, both humeri, portions of both fibulae, a fragment of right radius and a nearly complete right ulna. No pathologies were observed on any of the skeletal remains present.

The age of this person was determined to be adult based on the development of the long bones. Both the proximal and distal epiphyses are completely fused on all bones present.

Several traits of the post-cranium of Individual 25HN118-3 are indicative of the female sex. The maximum diameter of the right femoral head is approximately 42 millimeters (Krogman 1962). Furthermore, the overall morphology of all the long bones present is quite gracile, lacking distinct muscular attachments.

Stature was again calculated from the maximum length measurements of the right femur and tibia, using Trotter and Gleser (1958) formula for white females. The results indicate that this individual attained a maximum stature of approximately 5 feet 4 inches (163.3 ± 3.55 cm.) during young adulthood.

The skeletal remains of Individual 25HN118-4 are those of an adolescent, approximately 12-13 years of age. This individual is represented only by a portion of proximal right femoral diaphysis, fragments of both tibiae and one fragment of distal right radius. Age

determination was based on the observed development of the long bones present. No pathologies were observed.

Dental Remains Present:

The dental remains associated with the burial indicate the presence of three individuals. Based on the degree of observed tooth wear, these are apparently associated with the three adult individuals. Although most of the mandibular and maxillary remains are very poorly preserved, two portions of anterior mandible support our contention that at least two of the three adults present are female in that both are quite gracile in physical morphology and the mental protuberances are narrow and median.

All three individuals represented appear to be of somewhat different ages based on the observed amount of dental attrition present. The first individual is represented by a portion of anterior mandible with five remaining teeth; all four incisors and the right canine. Four loose teeth can also be attributed to this individual based on similar amounts of tooth wear. The remaining teeth consist of a right first mandibular premolar, a right second mandibular premolar, both central maxillary incisors, and a first maxillary molar. The degree of dental attrition observed on the maxillary molar (cusps extremely worn) indicate an age of approximately 26-33 years (Hrdlicka 1952). While no dental pathologies were observed, tartar is present on the remaining posterior teeth.

The second individual, represented by 14 loose teeth, appears to be over the age of 65 years based on the degree of tooth wear observed. All teeth present demonstrate wear through the crown to the gum line, exposing the roots. In the case of the anterior teeth, wear is to the point that the roots themselves appear to be resorbing leaving only small vestiges. The dental remains present consist of four mandibular incisors, both

central maxillary incisors, a mandibular second premolar, two maxillary first premolars, a right maxillary lateral incisor, and all four canine teeth. All the teeth with vestiges of crown still remaining demonstrate tartar buildup. No other dental pathologies were observed.

The third individual is represented by a nearly complete mandible, lacking the posterior left portion of the ascending ramus. Fragmentary portions of the right and left maxilla as well as the anterior maxilla are also present. The fragment of right maxilla still contains the second and third molars while the left side contains the first and second molars. The anterior maxillary fragment has the lateral incisors, canines and first premolars intact.

This individual demonstrates tooth wear to the degree that the crown is partially worn off, indicating an age of 50-70 years (Hrdlicka 1952). Tartar is present on several of the posterior teeth and minor decay of the first, left maxillary molar is apparent.

Cranial Remains:

As mentioned previously, the cranial remains recovered from site 25HN118 are highly fragmentary, few in number, and demonstrate a fair amount of ground warpage, making reconstruction impossible. For a complete listing of cranial remains see Appendix A. Even though no attempt was made to associate any of the cranial remains with the long bones of a specific individual, it may be significant to note several observations. Although the cranial remains of three adults appear to be present (the adolescent is represented by post-cranial material only), no observable traits of tne crania were discovered which would indicate the presence of a male. Several of the more diagnostic cranial remains present include a portion of left temporal with a very small mastoid process; a fragment of medial

frontal bone with small, gracile supra orbital bridge and a sharp supra orbital border; and two fragments of occipital bone, both of which demonstrate indistinct nuchal lines and lack prominent occipital protuberancies. While these observations are inconclusive at best, they do support our earlier contention, based on morphological characteristics of the long bones, that all three adults present are female.

Several discrete, non-metric traits were also recorded from the fragmentary cranial remains. Such observations include the presence of a complete metopic suture on a portion of frontal bone; a fragment of posterior mandibular ramus demonstrating a bridged mylohyoid groove; a temporal fragment with a small dehiscence through the tympanic plate; and the presence of a parietal foramen on one fragment of right parietal.

25HN118 Osteological Conclusions:

Although most of the skeletal remains recovered from site 25HN118 are poorly preserved, a total of four individuals was discerned. This number was determined primarily upon the results of analysis conducted on the post-cranial remains. Three of the individuals present appear to be adult females and one is an adolescent between 12 and 13 years of age. Measurements of long bones associated with the three adults (Table 7.1) were taken in order to determine stature and to assist in racial identity. The techniques used in obtaining these measurements follow the procedures outlined in Bass (1971) and Baker (1983).

The cranial and dental remains of three individuals are present within the collection. On the basis of discrete, non-metric observations, these appear to represent adult females. Based on the degree of dental attrition, the three females are of various ages. Unfortunately, none of the cranial or dental remains recovered are associated with the adolescent.

Table 7-1. Long bone measurements* from Individuals 25HN118-1, 25HN118-2 and 25HN118-3.

	INDIVIDUAL 25HN118-1		INDIVIDUAL 25HN118-2		INDIVIDUAL 25HN118-3	
	Right	Left	Right	Left	Right	Left
FEMUR						
Maximum length	403	400	-	-	438	436
Physiological length	396	394	-	-	431	429
Diameter of head	39	39	-	-	42	-
Anterior-posterior diameter of mid-shaft	22.8	23.1	-	-	29.0	28.8
Medio-lateral diameter of mid-shaft	23.6	23.3	-	-	(25)	23.4
Perimeter at mid-shaft	(75)	(75)	-	-	(87)	(87)
Subtrochanteric anterior-posterior diameter	20.5	21.0	-	-	23.5	22.5
Subtrochanteric medio-lateral diameter	28.5	28.0	-	-	31.0	29.3
Intercondylar femoral notch height	29.5	28.9	-	-	30.8	30.7
TIBIA						
Maximum length	-	339	-	-	354	-
Physiological length		328	-	-	349	352
FIBULA						
Maximum length	-	-	-	-	-	-
HUMERUS						
Maximum length	288	284	-	-	-	-
Maximum diameter of mid-shaft	19	19	-	-	-	-
Minimum diameter of mid-shaft	14	13	-	-	-	-
Diameter of head	38	37	-	-	-	-
RADIUS						
Maximum length	(231)	-	-	-	-	-
ULNA						
Maximum length	-	(252)	-	(249)	-	-

* - Measurements listed in this table are given in millimeters.

() - Indicates a closely estimated measurement.

Although it is argued that the cranial and dental remains belong to the same three adult individuals recognized through analysis of the post-cranial remains, it was impossible to assign any specific cranial or dental remains to the particular long bones of a single individual with any degree of certainty.

25HN174

The human skeletal remains recovered from site 25HN174 consist of the reasonably well preserved post-cranial remains as well as a fragmentary cranium, which has since been partially reconstructed (Figures 7.3a and b). A badly broken but partially restored cranium lacking the basilar portion of the occipital, a portion of the right maxilla, the right malar, the entire sphenoid and a portion of the right temporal are present. A nearly complete mandible is also present as well as a nearly complete left and fragmentary right humerus, both ulnae, a complete right and a nearly complete left radius, portions of both clavicles, an assortment of fragments representing both scapulae, most of the ribs and vertebrae (both highly fragmentary), a nearly complete right ilium with fragments representing both innominates, several sacral fragments, both femora, a left patella, a complete right and fragmentary left tibia, and a complete right and fragmentary left fibula. Several bones of the wrists, hands, ankles and feet are also present. These include a right capitate, a right carpal navicular, a right lunate, a right greater multangular, a left lesser multangular, two portions of distal metacarpal, three medial carpal phalanges, two distal carpal phalanges, both calcanea, a right talus, a right cuboid, two metatarsals, and one proximal tarsal phalanx. A complete listing of elements associated with the individual recovered from 25HN174 is given in Appendix B of this report.

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It is interesting to note, that while a majority of the teeth are still present within the mandibular alveolus, all the maxillary teeth, with the exception of the left canine, have been lost ante mortem. Correspondingly, resorption of the posterior maxillary alveolus appears to be quite advanced, preceding the loss of the anterior teeth (canines and incisors). Several of the mandibular teeth, including the left front molar, the left lateral and central incisor, the right central incisor and the first right premolar, appear to have been lost ante mortem as well (Figures 7.4a and b). This tooth loss is accompanied by an advanced degree of dental attrition where all teeth present are worn to the gum line, exposing the nerve cavity of the anterior teeth.

In addition to the alveolar resorption, a periodontal abcess is present on the mandibular right lateral incisor (Figure 7.4b). A similar infection may have caused the loss of the left front molar (Dr. Phillip Haram, DDS, personal communication). There is also tartar buildup present on the lingual surface of the mandibular molars and premolars.

Age at time of death has, in this case, been judged to be in excess of 65 years. This assessment is based on the observed degree of dental attrition previously described in accordance with Hrdlicka's method for determining age at death from the dental remains of American Indians (Ubelaker 1978), as well as the observed state of maxillary and mandibular atrophy. Although the individual is obviously quite old, the cranial sutures are all open and show no evidence of beginning fusion.

The skeletal remains present are clearly those of a male. This assessment has been supported by both anthroposcopic and anthropometric determinants. Giles and Elliot's (1962) formulae for sex determination place this individual clearly within the male range. Measurements of the maximum diameter of the proximal femoral heads (51 mm) is also strongly

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indicative of the male sex (Krogman 1962). This metric assessment has been further supported by several non-metric criteria of the cranial and post-cranial remains. These include the size of the supra-orbital ridge, the robusticity of the mastoid processes, presence of a distinct, well developed nuchal line and occipital protuberance, robusticity of the mandible in association with a prominent bilateral chin (Figure 7.3a), a narrow sciatic notch, and the overall robusticity of the long bones present.

Calculations used in accordance with Trotter and Gleser's (1958) Caucasian male formula for the determination of living stature from skeletal remains indicates that the individual attained a maximum height during young adulthood of 5 feet 9 inches (176.9 ± 2.99 cm.). Due to shrinkage of the vertebral disks with age, however, stature at time of death was probably somewhat less; approximately 5 feet 7 inches. These calculations were made using the maximum length measurement of the left femur and the right tibia as well as Trotter and Gleser's correction factor for individuals over 30 years of age.

By far the most difficult physical characteristic to ascertain from the skeletal remains present is that of racial affinity. Although it is quite clear that the individual was living a life style characteristic of a Plains Indian (i.e. the tightly flexed burial position in which he was found and the characteristic amount of tooth wear observed), many anthropmetric and anthroposcopic traits of the cranium and femora suggest that this individual was of Caucasoid ancestry.

Three quantitative metric methods for determining race from skeletal remains were applied within this analysis. The Giles and Elliot (1962) method placed this individual well within the Caucasoid range, as did a quantitative analysis of the interorbital region (Gill et al. 1982).

Likewise, the Gilbert and Gill (1984) metric method of race identification, based on femoral platymeria, indicates that this individual is strongly Caucasian.

A vast majority of the non-metric criteria commonly used in race determination further substantiate this metric assessment. The cranium has a high vault and is globular in profile with a rounded occipital region; the malars are reduced in size; the nose has a high, prominent bridge; the nasal aperture is extremely narrow as evidenced by a nasal index of 42.75 (Table 1); the nasal spine, although broken, was evidently quite prominent (7-9 mm); the nasal sill is sharp, the infraorbital fossa is deep; the zygomaxillary suture is strongly curved (Martindale and Gilbert 1984) and the mandible is characterized by a prominent, strongly bilateral chin.

Despite the age of the individual at time of death, only one pathology was observed on the skeletal remains examined. The articular surface of a portion of distal metacarpal demonstrates eburnation, indicating the occurrence of some sort of trauma to the joint which resulted in the deterioration of the intervening cartilage pad, bringing the metacarpal into direct contact with the proximal phalanx. The result of these two bones rubbing directly against each other over a period of years produced the polished, smooth articular surface observed on the distal metacarpal. Unfortunately, the corresponding proximal phalange is not present within the collection.

Results of the metric analysis for the individual from 25HN174 are presented in Table 7.2 and an evaluation of several discrete, non-metric traits of the cranium and mandible are presented in Table 7.3. Data were collected using standard anthropometric and anthroposcopic techniques (i.e. Bass 1971). A detailed description of these methods may also be found in

Table 7-2. Measurements and indices computed for individual recovered from 25HN174.

MEASUREMENTS

-Cranial-	
Maximum cranial length	176
Maximum cranial breadth	134
Nasion-occipital length	173
Nasion-bregma	109
Biasterionic breadth	104
Maximum frontal breadth	(114)
Bizygomatic breadth	(139)
Biauricular breadth	123
Auricular height	120
Porion-bregma	116
-Facial-	
Nasion-alveolor prosthion	(67)
Nasion-alveolar	(69)
Nasion-gnathion	(116)
Nasal height	56
Nasal breadth	24
L. orbital height	35
L. orbital breadth (dacryon)	42
L. orbital breadth (maxillo-frontale)	45
Bifrontal breadth	99
Porion-nasion	90
Porion-subnasale	89
Porion-prosthion	(92)
External alveolar length	(57)
-Mandible-	
Symphyseal height	(30)
Bigonial diameter	100
Bicondylar diameter	(121)
Ascending ramus breadth	33
Ascending ramus height	58
Corpal length	82
Gonial angle	22°

-Post Cranial-	Right	Left
Femur		
Maximum length	-	477
Physiological length	-	471
Diameter of head	51	51
Anterior-posterior diameter	33	33
Medio-lateral diameter	27	27
Perimeter at midshaft	-	96
Subtrochanteric anterior-posterior diameter	(27)	28
Subtrochanteric medio-lateral diameter	36	37
Intercondylar femoral notch depth	37	37
Tibia		
Maximum length	397	-
Physiological length	386	-
Fibula		
Maximum length	-	(377)
Humerus		
Maximum length	(333)	-
Max. Diameter midshaft	23	25
Min. Diameter midshaft	17	18
Diameter of head	-	-
Perimeter at midshaft	(70)	(72)
Radius		
Maximum length	266	(264)
Ulna		
Maximum length	285	(283)

Indices:

CRANIAL-FACIAL		
Cranial index	76.13	medium
Total facial index	83.45	broad
Upper facial index	49.64	broad
Nasal index	42.85	narrow nose
Orbital index (maxillo-frontale)	77.77	wide
Auricular mean height index	77.42	

* - Measurements listed in this table are given in millimeters unless otherwise designated.
() - Indicates a closely estimated measurement.

Table 7-3. Discrete nonmetric mandibular and cranial traits observed for individual recovered from 25HN174.

	OCCURRENCE		
	L		R
Parietal foramen	+		+
Epiteric bone	0		-
Mastoid sutural ossicle	-		0
Parietal notch bones	0		0
Tympanic dehiscence	+		+
Supraorbital foramen	+		0
Frontal foramen	0		+
Mylo-hyoid bridge	0		0
Accessory mental foramen	0		0
Epactal ossicle		+	
Inca bone		0	
Palatine torus		0	
Superior sagittal sinus-left		+	
Metopic suture		0	
Bregmatic bone		0	

(+) - indicates presence of trait
(0) - indicates absence of trait
(-) - indicates that trait cannot be assessed

Gill (1971). All the cranial indices used within the study have been defined by Bass (1971) and Jantz and Willey (1983).

A number of continuous, non-metric traits were also recorded for this individual. The genial tubercles were found to be quite small with the chin form being strongly bilateral and the chin projection pronounced. The eye orbits are rhomboid in form with a slight degree of inclination. The nasal profile is slightly concavo-convex and the nasal spine, although broken, is assessed to be quite large (7-9 mm). The nasal aperture itself is quite symmetrical and both sides of the nasal sill are sharp. The supraorbital ridge is of medium size and the auditory meatus is elliptic in form.

25HN174 Osteological Conclusions:

The skeletal remains recovered from site 25HN174 appear to be those of a robust male, 65 years of age or older. While the individual was evidently living a lifestyle characteristic of a prehistoric Plains Indian, as evidenced by the flexed burial position and the characteristic pattern and degree of dental wear observed, the overwhelming abundance of what are normally considered typical Caucasoid skeletal traits presents a somewhat unique situation. Considering the results of radiocarbon analysis, the abnormally high frequency of what are usually considered Caucasian skeletal traits can be accounted for by one of two factors; either what are currently considered typical Caucasian skeletal traits were more prevalent in early Indian populations than is currently recognized, or the individual is simply atypical and not at all representative of the overall population.

CHAPTER EIGHT

MORTUARY PRACTICES

The following section discusses the mortuary practices which can be inferred from the available data. This discussion is based on several sets of data: condition of the bone, frequency of various elements, and provenience information. Although much of this information has been presented in more detail throughout previous portions of this presentation, it is again summarized as it pertains to the inferences which can be made concerning mortuary practices.

25HN118

It has been suggested that certain aspects of the observed condition of the bone are due to human action. This is particularly true of the patterned destruction of the articular ends of certain long bones. Modifications caused by predator-scavengers have been relatively minor.

Certain elements and/or portions of elements are also under represented. These include the distal portions of the radius, ulna and tibia as well as the various bones of the hand and foot. Using only the number of mature individuals represented in the collection, the maximum potential number of hand and foot bones would be 48 carpals, 30 metacarpals, 84 hand phalanges, 42 tarsals (including the talus and calcaneus), 30 metatarsals and 84 foot phalanges. However, only four carpals, one hand phalanx, eight tarsals, three metatarsals and three foot phalanges have been identified and many of these are incomplete. Of the tarsals present, four are calcanea, three are tali and one is a cuboid. A

similar situation is reported by Phenice (1969:56) in his analysis of skeletal materials recovered from the Schultz mounds in east-central Kansas:

> A tentative explanation for the observed differences is that some type of selection was operating, which resulted in the more frequent burial of the components of the elbow joint, and the concomitant destruction or loss of the components of the shoulder and wrist joints.

Vertebrae are also under represented. Again, using the number of adult individuals identified, the maximum potential number of vertebrae would be 21 cervical, 36 thoracic and 15 lumbar. The number actually recovered is far less. Two cervical, six thoracic, and three lumbar vertebrae can be identified from the fragments present in the collection. While some of this deficiency may be due to factors of preservation, Phenice (1969:55) also observed that the vertebral column was poorly represented and states that "selection against them [vertebrae] seems a likely explanation of this deficiency."

As mentioned previously, provenience of the specific elements is by excavation square only and the size of the excavation squares is unknown. Based on the relative size of elements included on sketches drawn by the excavators, each of the larger squares (A1, A2, A3 and A5) are assumed to be a rectangle approximately one-by-two feet in size. Square 4 is approximately half the size of the larger squares. In addition, material was recovered from the surface and much of the material has no provenience recorded.

The majority of the elements associated with Individual 25HN118-1 were recovered from excavation squares 1 and 2. These two squares are contiguous and comprise a total area approximately two feet square. The only elements from Individual 25HN118-1 which were definitely not recovered

from these squares are the distal condyle of a right femur recovered from the surface, and a left humerus, radius and ulna unit for which the provenience is unknown. Based on the available provenience information a flexed or bundle burial is suggested.

Some elements representing Individual 25HN118-2 were recovered from the surface and from excavation squares 2, 3 and 5. However, the majority of material has no recorded provenience. As previously stated, rodent gnawing is evident on many of the long bones from this individual and post depositional factors seem to have played a major role in the observed distribution of materials.

Elements comprising Individual 25HN118-3 were recovered from the surface and from all five excavation squares. While the majority of long bones were broken, the larger fragments of the leg bones were primarily recovered from squares A2 and A3 and the arm bones were recovered from square A5. This individual may represent an extended burial or one in which the bones were grouped by body parts.

The remains of Individual 25HN118-4 were recovered from excavation squares A2 and A3. Only four elements representing this individual were recovered and it is therefore difficult to determine the type of burial represented.

Due to the lack of adequate provenience information, it is difficult to substantiate even such basic interpretations as whether these individuals represent flexed or extended burials. However, reports on previous burial excavations in the general vicinity of 25HN118 indicate that "Bones of all sorts were intermingled, and each pit contained the remains of numerous individuals" (Strong 1935:119). This appears to have been the case at site 25HN118. The total area of excavation is estimated to be approximately two feet by five feet with a minimum number of four individuals recovered.

With the possible exception of Individual 25HN118-1, the elements appear to be scattered randomly. Perhaps the only definitive statement which can be made is that a combination of burial types is represented.

The above information as well as that presented by O'Brien (1971) has been used in the following reconstruction of mortuary practices suggested for 25HN118. First, the remains of the deceased were set aside and defleshing by exposure occurred. It is suggested that these remains were carefully watched and protected against the actions of predator-scavengers. Sometime during this interval of exposure, the individuals hands and feet were removed. This action may have been associated with other religious ceremonies honoring the dead and preparing them for final interment. The amount of time between the death of an individual and their final interment is unknown but it is suggested, based on the fact that both primary extended burials and secondary burials are reported (Hill and Kivett 1940), that this interval of time varied. It therefore seems likely that this collection and final interment may have been associated with seasonal, annual or other periodic events.

Next, the remains of the individual or individuals who died during a given period of time were collected. Based on the available literature (e.g. Phenice 1969; O'Brien 1971) as well as the elements recovered from 25HN118, it is suggested that not all elements were buried and that certain elements were consistently selected against. At site 25HN118, elements which were not buried came from the hands and feet and, to a lesser extent, the vertebral column. This process of selection as an important chronological indicator will be discussed in the following chapter.

The collected remains, along with minimal amounts of burial goods, were then placed either in a pit or on cleared ground. At site 25HN118, it

appears that some type of burial pit was used since there is no indication of a mound present. However, it is possible that a slight mounding was originally present and that plowing and the effects of inundation have subsequently altered the original surface topography. Finally, there may have been some type of ceremony associated with final interment as earth was placed over the remains. O'Brien (1971:178) suggests that "social class is indicated since some people were buried in mounds in association with a funerary fire rite, while others with a lower status were placed in pits with no attendant fire ceremony." If this indeed true, than the individuals recovered from 25HN118 were of a "lower status."

25HN174

The remains of one individual were recovered from 25HN174. This individual was in a flexed position, lying on his right side, and faced to the east (Figure 8.1).

Previous sections of this report have described the morphology of the bone recovered from 25HN174. It appears that the bone has not been subjected to human or predator-scavenger modification.

Although elements of the vertebral column are somewhat underrepresented, this is apparently due to the deterioration of the vertebrae and the fact that identification of the actual number of vertebrae present is difficult because of their fragmentary nature. Examination of available photographs confirms this assumption. It is also interesting to note that a larger number of hand and foot bones were recovered from the single individual present at 25HN174 than the total from site 25HN118 (see Appendices A and B).

Site 25HN174 was originally noted by the presence of human bones exposed along the vertical face of a cutbank. Available sketches and notes

Figure 8.1. Burial position of individual recovered from 25BN173.

from the excavation indicate that the skull and perhaps several elements of the hand were recovered from the slumpage adjacent to the cut bank. It is suggested that slumpage of the bank edge has displaced or destroyed some of the elements or portions of elements missing from the assemblage.

The osteological materials associated with site 25HN174 were recovered from a depth of approximately four feet below ground surface. All of the material was recovered from the south half of a five-by-five foot excavation unit. Soil associated with these elements was described as a light yellow-brown loess. The fill overlaying this loess was described as a gray colored, compact caliche layer. The profile sketch indicates that this caliche layer was approximately one foot thick within the five-by-five foot excavation unit. No indication of any intrusion, such as a burial pit, through the caliche layer is given either in excavation notes, photographs taken of the cut bank or photographs taken of the north wall of the excavation unit. If this caliche layer was in fact continuous over the entire excavation unit, then the burial itself must predate its formation. Overlaying the caliche layer was a medium brown loess. This brown loess extended from surface to approximately 2 feet below surface. The fact that soils in the vicinity of 25HN174 are examples of mature soils (Mitchell et al. 1974) and that no indication of any interruption in natural soil development is indicated either in profiles or photographs suggests considerable antiquity to the burial at site 25HN174. As previously stated, a radiocarbon date of 1600 ± 110 B.P. (Beta 10209) was obtained from a small charcoal sample using accelerator dating techniques.

The following mortuary practices can be suggested for 25HN174. The completeness of the skeleton indicates that the burial was primary. The extremely flexed nature of the individual suggests that some type of small, circular to ovoid burial pit was used. Although no mention is made of such

a feature and no indication is present in the available photographs, it is possible that a shallow burial pit was dug, the individual placed in it, and then the pit refilled with the same soil matrix. If the same soil dug from the pit was used to refill it, any evidence of a feature would have been difficult to recognize.

No cultural material was found in association with the burial. Any artifacts that may have been included did not preserve or were displaced by the same bank slumpage responsible for exposing the burial. However, individual burials of certain cultural traditions typically have few associated grave goods (e.g. Finnegan 1978, Gill and Clark 1983). The suggestion of Breternitz et al. (1971:81) appear relevant to the discussion of the mortuary practices represented at site 25HN174:

> Burial activities and associated artifacts on this early horizon, may be expected to vary relative to sex and status of the deceased. Grave good variability is also a function of the artifacts available to and the manufacturing skills of person participating in the burial ritual.

It may be that the individual was of no special religious or social significance and that such a high value was placed on the available artifacts that few, if any, were included within the burial ritual.

CHAPTER NINE

25HN118 COMPARISONS

Although absolute dates could not be determined, it is suggested, on the basis of burial practices, that site 25HN118 is affiliated with the Plains Woodland tradition. The lack of diagnostic cultural material and absence of cranio-metric observations further limits the types of comparisons which can be made. However, the sparsity of cultural material associated with the burials at 25HN118 is, in itself, important. The following discussion will begin by examining the types or lack of cultural materials found in association with other burials similar in location and overall morphological characteristics to site 25HN118. Frequencies of osteological materials recovered from 25HN118 will then be compared to several other burials from the vicinity.

Very few burial goods are reported for the DO-2 site, the Christensen site and several of the mounds excavated at the Bakenhus site (Hill and Kivett 1940), as well as the Taylor Mound site (O'Brien 1971). These sites have been assigned to the Valley focus of the Plains Woodland tradition (O'Brien 1971). While some cultural material was recovered from these sites, relatively little was actually found in association with the burials. O'Brien (1971:169), in describing the Taylor Mound reports that, "except for the greenstone celt and possibly the ovate blades, all the artifacts from the mound were a part of the fill of the mound and were carried in accidentally during its construction." It is suggested that the

lack of large numbers of artifacts is a characteristic of Valley focus mortuary practices (see also Chapter Three).

The sparsity of cultural materials associated with Valley focus burials contrasts drastically with burials associated with the Keith focus. Wedel (1959:553), in his discussion of the Keith focus mortuary complex, states that "mortuary offerings include large numbers - often running into the thousands - of shell disk beads and bead blanks, many of the latter unperforated, as well as shell pendants, chipped stone, and occasionally other items". At the Marshall ossuary, for instance, "over 8,000 beads were recovered in our own excavation, and very many times this number have been removed at various times by local collectors" (Strong 1935:120). Kivett (1953:135) also states that there are certain burial traits which appear to be diagnostic of the Keith focus:

> These include the abundant use of grave furnishing of ornaments fashioned from both fresh-water and marine shells, with a large number of blanks and unfinished shell-disk beads; triangular pendants; crescent pendants; right-angle-perforated beads; small chipped celts; small to large stemmed and barbed projectile points, often serrated; incised tubular bone beads; perforated canine teeth...; unperforated rodent teeth; and pottery of the Harlan Cord-Roughened type.

The practice of including large numbers of offerings within communal burials is also characteristic of the Republican variant of the Central Plains tradition. At the Graham ossuary, abundant ceramics, chipped and ground stone tools, and artifacts of bone, shell, antler and copper were recovered (Strong 1935:108-114). Relatively large numbers of artifacts were also recovered from the Alma ossuary (Strong 1935:123).

It seems likely, therefore, based on comparisons to other recorded burial patterns, that 25HN118 is most similar to Valley focus burial sites. These sites are characterized by both primary and secondary burials within a communal ossuary with only a small number of associated grave goods.

Phenice (1969), in his description of skeletal material from north-central Kansas, includes limited information on the types of cultural material found in association with the burials discussed. In citing the work of Eyman (m.s.), Phenice (1969) has associated the cultural material recovered from these burial sites to either Hopewellian, Woodland or Central Plains affiliations. While the use of these terms as well as the methodology employed in determining affiliations is questionable, there is a real dichotomy present in terms of the types and quantity of cultural materials present. For instance, many of the sites are described as being affiliated with the Woodland and Central Plains traditions. Typically, these sites contained large amounts of cultural materials including pottery, fresh water shell, beads, bone ornaments and projectile points in association with the osteological remains. It is suggested that these sites are perhaps associated with phases of Early Late Woodland, Late Woodland, or the Central Plains tradition.

Four of the sites discussed by Phenice (1969) contained very little cultural material. These sites, which include Younkin 1 (14GE2), Younkin 3 (14GE3), A. Berry 1 (14GE4) and Dixon (14GE7), were not affiliated with any tradition or temporal period (Phenice 1969). No pottery was recovered from any of these burials. Only a single item was recovered from both Younkin 3 and A. Berry 1, while no artifacts were recovered from Younkin 1. It is suggested that these four sites are similar to 25HN118 and that they can be assigned to the Valley focus (phase) of the Plains Woodland tradition on the basis of mortuary practices.

Figures 9.1, 9.2 and 9.3 illustrate the comparative percentages of elements recovered from the sites discussed by Phenice (1969) and Table 9.1 lists the actual counts of these elements. The sites included in Figures 9.1 and 9.2 are those which, according to Phenice (1969) and Eyman (M.S.),

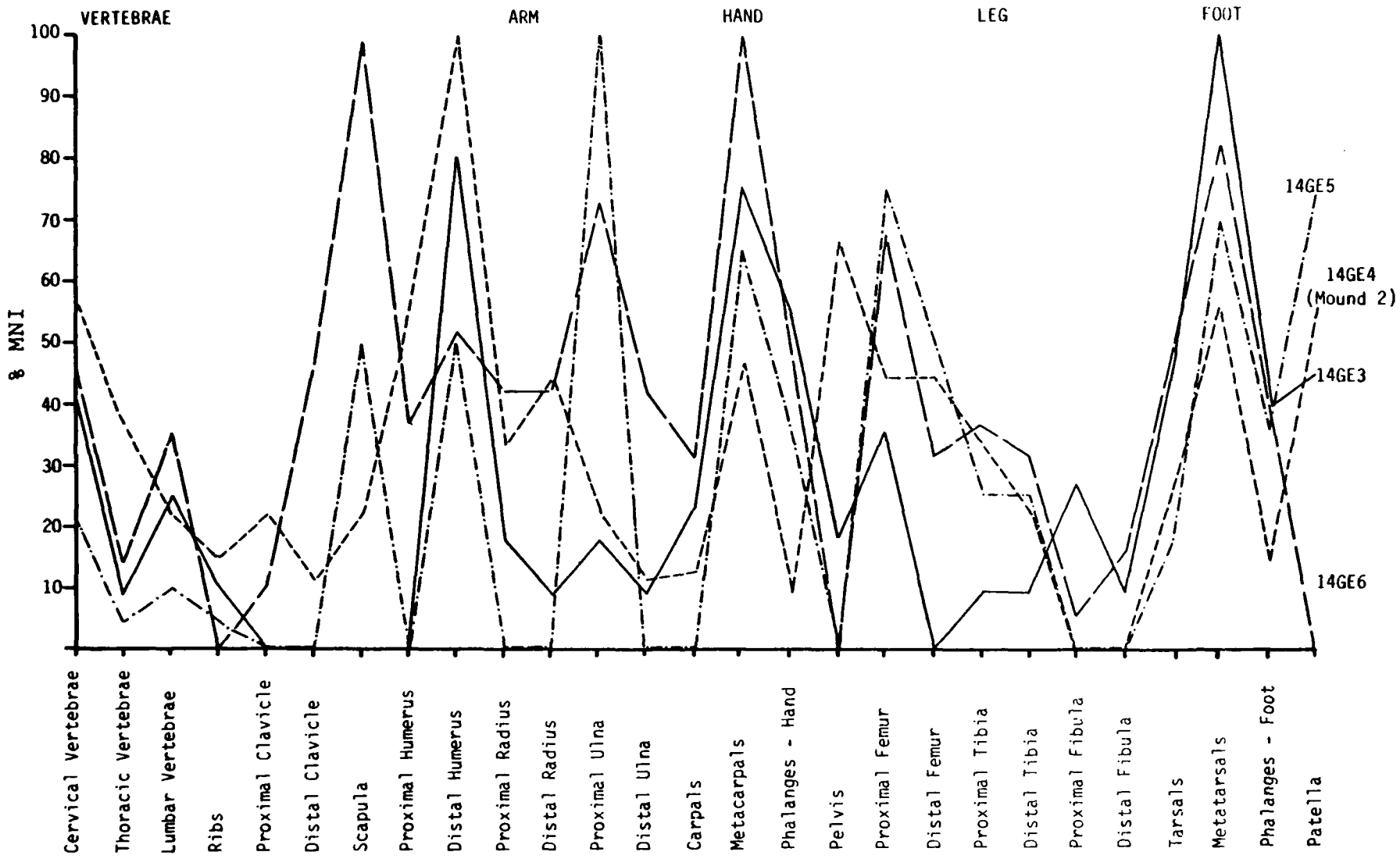

Figure 9.1. Comparative percentages of bone elements identified by Phenice (1969) for sites 14GE3, 14GE4 (Mound 2), 14GE5 and 14GE6.

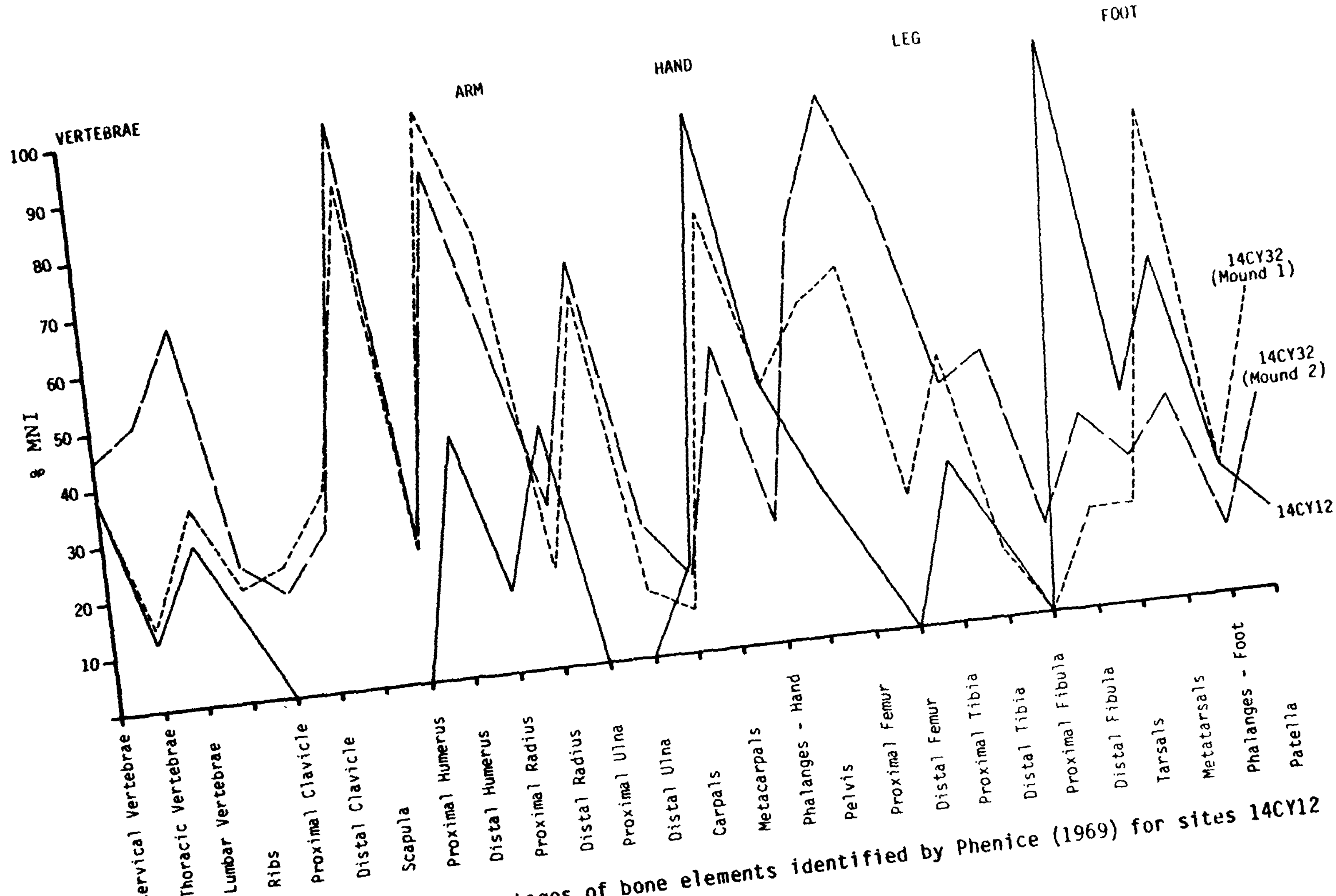

Figure 9.2. Comparative percentages of bone elements identified by Phenice (1969) for sites 14CY12 and 14CY32 (Mounds 1 and 2).

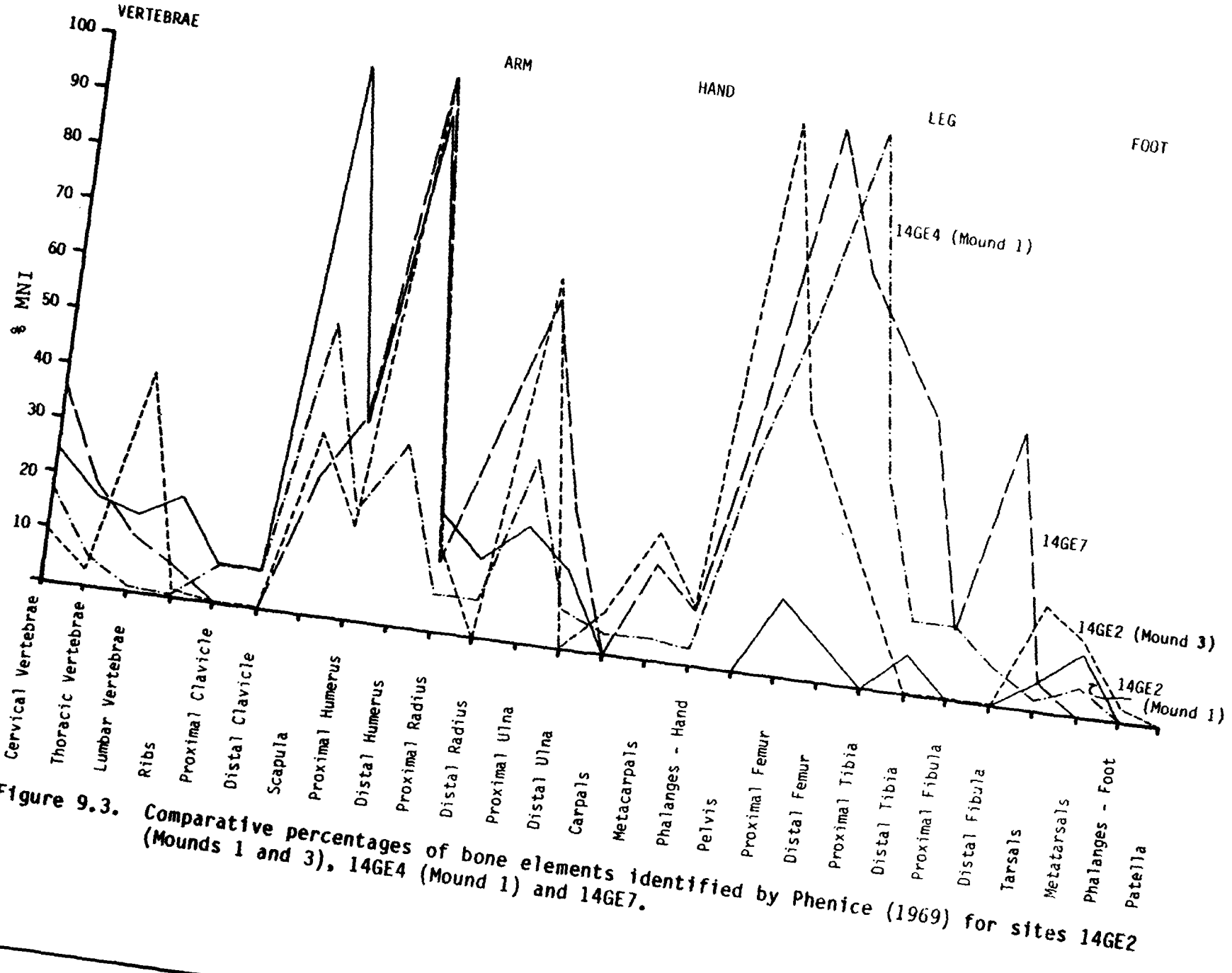

Figure 9.3. Comparative percentages of bone elements identified by Phenice (1969) for sites 14GE2 (Mounds 1 and 3), 14GE4 (Mound 1) and 14GE7.

Table 9.1. Comparative percentages and numbers of bone elements.

		14GE3	14GE4 (Mound 2)	14GE5	14GE6	14CY12 (Mound 1)	14CY32 (Mound 1)	14CY32 (Mound 2)	14GE2 (Mound 1)	14GE2 (Mound 3)	14GE4 (Mound 1)	14GE7	Total of sites illustrated in Fig. 9.1 & 9.2	Total of sites illustrated in Fig. 9.3	Taylor Mound	25HN118	25HN174
Cervical Vertebrae	%	40.8	57.1	21.4	46.1	40.8	36.9	45.1	24.5	9.5	17.1	35.7	54.4	29.5		9.5	43.0
	No.	16	18	3	31	10	22	60	12	2	9	10	160	33		2	3
Thoracic Vertebrae	%	8.9	37.0	4.2	13.9	11.9	14.7	50.9	16.7	2.8	5.6	18.8	35.5	15.1	1.8	16.6	8.0
	No.	6	20	1	16	5	15	116	14	1	5	9	179	29	1	6	1
Lumbar Vertebrae	%	25.0	22.2	10.0	35.4	28.6	35.3	67.3	14.3	40.0	0.8	10.0	54.2	20.0	8.9	20.0	100.0
	No.	7	5	1	17	5	15	64	5	6	3	2	114	16	2	3	5
Ribs	%	10.4	14.8	4.2	0	14.2	20.0	24.1	18.5	1.4	0.5	5.2	19.3	10.2	11.1	15.2	16.6
	No.	14	16	2	0	12	41	110	31	1	2	5	195	39	12	11	4
Proximal Clavicle	%	0	22.2	0	10.4	0	23.5	18.4	7.1	0	6.7	0	17.9	6.3		0	50.0
	No.	0	2	0	2	0	4	7	1	0	1	0	15	2		0	1
Distal Clavicle	%	0	11.1	0	46.9	0	35.3	28.9	7.1	0	6.7	0	32.1	6.3		0	50.0
	No.	0	1	0	9	0	6	11	1	0	1	0	27	2		0	1
Scapula	%	0	22.2	50.0	99.0	0	88.2	100.0	100.0	33.3	53.3	25.0	90.5	81.3		66.6	50.0
	No.	0	2	2	19	0	15	38	14	2	8	2	76	26		4	1
Proximal Humerus	%	0	55.5	0	36.5	0	23.5	26.3	35.7	16.7	20.0	37.5	30.9	37.5		50.0	0
	No.	0	5	0	7	0	4	10	5	1	3	3	26	12		3	0
Distal Humerus	%	80.4	100.0	50.0	52.1	42.9	100.0	89.5	92.9	100.0	33.3	100.0	100.0	100.0		83.3	100.0
	No.	9	9	2	10	3	17	34	13	6	5	8	84	32		5	2
Proximal Radius	%	17.8	33.3	0	41.7	14.2	76.5	57.9	21.4	16.7	6.7	12.5	58.3	18.8		33.3	100.0
	No.	2	3	0	8	1	13	22	3	1	1	1	49	6		2	2
Distal Radius	%	8.9	44.4	0	41.7	42.9	17.6	28.9	14.3	0	6.7	37.5	35.7	18.8		33.3	100.0
	No.	1	4	0	8	3	3	11	2	0	1	3	30	6		2	2
		Fig. 9.1				Fig. 9.2			Fig. 9.3								

Table 9.1 (Continued). Comparative percentages and numbers of bone elements.

		14GE3	14GE4 (Mound 2)	14GE5	14GE6	14CY12 (Mound 1)	14CY32 (Mound 1)	14CY32 (Mound 2)	14GE2 (Mound 1)	14GE2 (Mound 3)	14GE4 (Mound 1)	14GE7	Total of sites illustrated in Fig. 9.1 & 9.2	Total of sites illustrated in Fig. 9.3	Taylor Mound	25HN118	25HN174
Proximal Ulna	%	17.8	22.2	100.0	72.9	0	64.7	71.0	21.4	66.7	33.3	62.5	71.4	53.1		83.3	100.0
	No.	2	2	4	14	0	11	27	3	4	5	5	60	17		5	2
Distal Ulna	%	8.9	11.1	0	41.7	0	11.7	23.7	14.3	0	6.7	25.0	25.0	12.5		50.0	100.0
	No.	1	1	0	8	0	2	9	1	0	1	2	21	4		3	2
Carpals	%	23.4	12.5	0	30.6	16.1	7.4	13.8	0	8.3	3.3	0	20.5	3.1	4.2	8.3	31.3
	No.	21	9	0	47	9	10	42	0	4	4	0	138	8	3	4	5
Metacarpals	%	75.0	46.6	65.0	100.0	94.3	76.5	53.2	0	23.3	4.0	17.5	88.3	10.6	2.2	0	20.0
	No.	42	21	13	96	33	65	101	0	7	3	7	371	17	1	0	2
Phalanges - Hand	%	54.8	8.7	35.7	52.1	45.9	45.8	21.0	0	10.7	2.9	9.8	44.4	5.8	4.8	3.6	17.8
	No.	86	11	20	140	45	109	112	0	9	6	11	523	26	6	3	5
Pelvis	%	17.8	66.6	0	0	28.6	58.8	73.7	0	100.0	40.0	50.0	57.1	50.0	100.0	50.0	100.0
	No.	1	3	0	0	1	5	14	0	3	3	2	24	8	9	3	2
Proximal Femur	%	35.7	44.4	75.0	67.7	14.2	64.7	94.7	14.3	50.0	66.7	100.0	85.7	71.9		66.6	100.0
	No.	4	4	3	13	1	11	36	2	3	10	8	72	23		4	2
Distal Femur	%	0	44.4	50.0	31.2	0	23.5	73.9	7.1	33.3	100.0	75.0	52.4	75.0		100.0	100.0
	No.	0	4	2	6	0	4	28	1	2	15	6	44	24		6	2
Proximal Tibia	%	8.9	33.3	25.0	36.5	28.6	47.1	42.1	0	16.7	40.0	62.5	45.2	37.5		83.3	100.0
	No.	1	3	1	7	2	8	16	0	1	6	5	38	12		5	2
Distal Tibia	%	8.9	22.2	25.0	31.2	14.2	11.8	47.4	7.1	0	13.3	50.0	36.9	21.9		66.6	100.0
	No.	1	2	1	6	1	2	18	1	0	2	4	31	7		4	2
		Fig. 9.1				Fig. 9.2			Fig. 9.3								

Table 9.1 (Continued). Comparative percentages and numbers of bone elements.

		14GE3	14GE4 (Mound 2)	14GE5	14GE6	14CY12 (Mound 1)	14CY32 (Mound 1)	14CY32 (Mound 2)	14GE2 (Mound 1)	14GE2 (Mound 3)	14GE4 (Mound 1)	14GE7	Total of sites illustrated in Fig. 9.1 & 9.2	Total of sites illustrated in Fig. 9.3	Taylor Mound	25HN118	25HN174
Proximal Fibula	%	26.8	0	0	5.2	0	0	15.8	0	0	13.3	12.5	11.9	9.4		0	100.0
	No.	3	0	0	1	0	0	6	0	0	2	1	10	3		0	2
Distal Fibula	%	8.9	0	0	15.6	100.0	17.6	34.2	0	0	6.7	50.0	32.1	15.6		66.6	50.0
	No.	1	0	0	3	7	3	13	0	0	1	4	27	5		4	1
Tarsals	%	44.6	27.0	17.9	46.1	36.7	17.6	25.6	5.1	19.0	1.9	5.4	38.4	8.0	4.8	19.0	29.0
	No.	35	17	5	62	18	21	68	5	8	2	3	226	18	3	8	4
Metatarsals	%	100.0	55.6	70.0	82.3	60.0	85.9	35.8	11.4	13.3	5.3	0	80.0	10.0	2.2	10.0	30.0
	No.	56	25	14	79	21	73	68	8	4	4	0	336	16	1	3	3
Phalanges - Foot	%	38.9	13.5	35.7	43.5	22.4	22.3	11.7	0	2.4	0	0	29.9	0.4		1.2	3.6
	No.	64	17	20	117	22	53	62	0	2	0	0	352	2		1	1
Patella	%	44.6	55.5	75.0	0	14.2	52.9	34.2	0	0	0	0	42.8	0		50.0	50.0
	No.	5	5	3	0	1	9	13	0	0	0	0	36	0		3	1
		Fig. 9.1				Fig. 9.2			Fig. 9.3								

contained large amounts of cultural materials. Sites included in Figure 9.3 contained very little or no cultural material (Phenice 1969). All of the figures have been subdivided into major skeletal parts (i.e. vertebrae, arm, hand, leg and foot).

The "% MNI" on the Y-axis of these figures have been calculated using the procedure described by Binford (1978:69-72). This approach first calculates the number of individuals represented by each bone element and then scales all of these relative to the bone element which yields the greatest minimum number (i.e. 100% MNI). As Binford (1978:72) states, "using this convention we can compare the relative frequencies of different bones on a standard scale from 1 to 100 regardless of differences in the size of the populations compared."

It is important to note that the osteological analysis and identification of skeletal material recovered from all the sites illustrated in Figures 9.1 through 9.3 was completed by one investigator, thus eliminating many biases which could have been introduced if several different people had been involved. Also, Phenice (1969:53) states:

> The skeletal remains recovered from the mounds are assumed to represent a fairly complete recovery of the original interments. Schultz's techniques appear to have been relatively detailed and thorough, since the collection contained large amounts of small and fragmentary bones which could have been overlooked or discarded by a less serious and thorough excavator.

The fact that one individual, Floyd Schultz, conducted the excavation in an apparently thorough manner further eliminates many biases potentially introduced by differing recovery techniques.

Several interesting trends are apparent in the percentages of skeletal parts illustrated in Figures 9.1 through 9.3. In terms of vertebrae, there is a tendency for cervical vertebrae to be more common than either the thoracic or lumbar vertebrae. This is true for all sites with the

exception of site 14CY32, Mound 2 (Figure 9.2) and site 14GE2, Mound 2 (Figure 9.3). One possible explanation for this is that cervical vertebrae, particularly the atlas and axis, have more diagnostic features and are perpahs more easily identified. However, Phenice (1969:55) also noted this trend and suggested that selection against the thoracic vertebrae may be the cause for the noted deficiency.

With the exception of site 14GE4, Mound 2 (Figure 9.1), there are higher percentages of lumbar compared to thoracic vertebrae for all sites represented in Figures 9.1 and 9.2. A different situation is apparent in Figure 9.3 where, with the exception of site 14GE2, Mound 2, there is a trend for sites to show a slightly lower percentage of lumbar vertebrae when compared to either cervical or thoracic. These sites, however tend to show an overall deficiency in both thoracic and lumbar vertebrae.

It is difficult to explain these differences in the percentages of lumbar and thoracic vertebrae. Preservation of the slightly larger lumbar vertebrae seems an unlikely explanation and as Phenice (1969:55) states, "there seems to be no reason why natural forces of decay and destruction, or excavation procedures, would have singled out the thoracic vertebrae and left the others." Also, if this variation is due to differential preservation, then it seems likely that similar trends should be apparent for all sites since this would have remained a relatively constant factor.

The increase in the percentage of lumbar vertebrae illustrated in Figures 9.1 and 9.2 compared to the decrease in Figure 9.3 seems to contradict an explanation based on differential preservation of the lumbar versus thoracic vertebrae. One possible explanation is that burial customs operative at the sites illustrated in Figures 9.1 and 9.2 placed a greater emphasis on the skull and appendicular skeleton while elements of the thorax where not intentionally included. This is further exemplified in

Figures 9.1 and 9.2 by the nearly equal percentage of ribs compared to thoracic vertebrae. Lumbar vertebrae were included as these may have remained attached to the pelvic girdle and lower appendicular skeleton. At the sites illustrated in Figure 9.3, selection, either intentionally or as a matter of convenience, against the thorax is also suggested. Additionally, the overall low percentage of vertebrae present at sites illustrated in Figure 9.3 suggests that less of an effort was expended in attempting to include any axial elements in the burials.

The next grouping of skeletal parts to be discussed are the elements of the arm. A bimodal distribution is indicated in Figures 9.1 through 9.3. In all of these figures, peaks correspond to the distal humeri and proximal ulnae. Two exceptions to this are site 14GE4, Mound 2 (Figure 9.1) and 14CY12 (Figure 9.2) where peaks occur at the distal humeri and distal radii. Regarding this, Phenice (1969) has suggested that selection against the burial of the shoulder and wrist joints occurred. This would explain the increase in the relative percentage of elbow joints. It seems likely that the arm was cut or chopped free at or near the proximal end of the humerus and the hands chopped free near the distal radius-ulna. The arm was buried as a single unit with no disarticulation at the elbow joint.

The percentage of hand elements associated with the sites illustrated in Figures 9.1 and 9.2 is relatively high compared to the sites illustrated in Figure 9.3. This is one of the most important distinctions noted between the two groups of sites (i.e. burials with large amounts of associated cultural material versus burials with little or no cultural material). Burials with large amounts of associated cultural material (Figures 9.1 and 9.2) also show a relatively high percentage of hand bones whereas burials with few associated grave goods have a low percentage of

bones from the hands. It is suggested that the burial customs associated with sites in Figures 9.1 and 9.2 included large amounts of offerings as well as the intentional inclusion of the hand. The opposite is indicated for the sites illustrated in Figure 9.3. This difference will be discussed in greater detail below.

The next grouping of elements discussed are those of the leg. With two exceptions (site 14GE4, Mound 1, Figure 9.3 and 14GY12, Figure 9.2), proximal femora are the most frequent of the leg elements illustrated in Figures 9.1 through 9.3. It is difficult to explain this patterning in terms of differential preservation. There seems to be no reason why the proximal portion would tend to be better preserved than the distal portion of the femur or the proximal tibia. These are all large articular surfaces and natural deterioration should have been relatively uniform. Cultural selection may be partially responsible. It is interesting to note that a reversal in the relative percentage of pelves and femora is indicated for several of the sites in Figures 9.1 through 9.3 and that very few of the sites have equal percentages of pelves and femora. If there is a low frequency of pelves, than the frequency of proximal femora is relatively high. However, if the frequency of pelves is high, than the frequency of proximal femora is lower. Disarticulation of the leg could have occurred either by chopping through the innominate or by chopping through the proximal head of the femur. The first method would have resulted in the destruction of the pelvic region while causing little damage to the proximal femur. Conversely, chopping through the proximal neck of the femur would have caused little damage to the pelvic region. It is suggested that both methods of disarticulation were practiced. Inter-site differences may be due to consistencies of intra-group burial practices.

Unlike the elbow joint of the arm, the leg may also have been disarticulated at the knee. This would explain the nearly uniform decrease in the percentage of lower leg elements. It is also interesting to note that the frequencies of distal femora, proximal tibiae and patellae vary independently, suggesting that the leg was disarticulated at the knee joint before burial. Like the hand, frequencies of foot bones are markedly lower at the sites represented in Figure 9.3 than those represented in Figures 9.1 and 9.2.

As previously suggested, different burial customs may be the reason for differences in the amount of grave offerings and treatment of the foot and hand bones at these two groups of sites. These burial customs may, in fact, be related to temporal differences.

Unfortunately, none of the sites illustrated in Figures 9.1 through 9.3 have been radio-carbon dated and apparently none have been conclusively assigned to a particular tradition, variant or phase. The problem of dating is not unique to the sites illustrated. Few of the burial sites discussed by Strong (1935), Hill and Kivett (1940), Kivett (1953) or Wedel (1959) have been radio-carbon dated. However, the authors were able to assign many of these to a particular segment of the Plains Woodland tradition.

As mentioned previously, other burials located in the Central Plains subarea which have been assigned to the Valley focus tend to have few, if any, associated cultural materials. Perhaps the most adequately dated Valley focus burial site is Taylor Mound (O'Brien 1971). This site has been radiocarbon dated at A.D. 10 ± 140 (M-2343), A.D. 290 ± 140 (M-2344) and A.D. 10 ± 140 (M-2345). The only cultural material definitely associated with the burials are a greenstone celt and two ovate blades (O'Brien 1971).

While the description of osteological material recovered from the mound is incomplete, frequencies appear to be very similar to those illustrated in Figure 9.3:

> Tne largest portion of the post-cranial material consisted of fragmentary femora, tibiae, humeri, and radii. A somewhat smaller portion represented fibulae, radii, and ulnae. There were fragments of four right and five left innominants. The remaining skeletal parts consisted of two calcanii, one patella, three carpals, one tarsal, and six hand phalanges (two proximal, two medial, and two distal). There were also fragments of two clavicles, one scapula, one metatarsal, one metacarpal, and twelve ribs. The vertebral remains included the fragments of one sacrum, one thoracic, and two lumbar vertebrae. One ossified thyroid cartilage was present.
>
> It is apparent that there was a strong selection for cranial, innominant, and major long bones, and a strong selection against the sternum, vertebrae, ribs and bones of the extremities (Klepinger and Bass 1971:183-185).

Table 9.1 includes only those counts of elements recovered from Taylor Mound were sufficient data are available. Of particular significance is the frequencies of hand and foot bones (Table 9.1). In terms of these frequencies, Taylor Mound conforms to the patterning suggested for the sites illustrated in Figure 9.3.

In contrast to the Taylor Mound, the Woodruff ossuary (14PH4) yielded large amounts of cultural material. "These include pottery sherds; artifacts of stone, bone, and antler; and objects fashioned from both fresh-water and marine shells. Artifacts occurred throughout both the large basin and the smaller pits" (Kivett 1953:118). Unfortunately, no counts of skeletal elements are available from the Woodruff Ossuary so it is impossible to compare it to sites illustrated in Figures 9.1 through 9.3. However, Plates 18b, 19a, 20a and 20b (Kivett 1953) are particularly interesting in that both articulated hands and feet as well as individual hand and foot bones appear to be present in the burials.

Figure 9.4 compares the frequencies of elements recovered from 25HN118 against the frequencies calculated for the combined sample of sites illustrated in Figures 9.1 and 9.2 and the combined sample of sites included in Figure 9.3. As mentioned previously and as suggested above, sites illustrated in Figures 9.1 and 9.2, which contained large amounts of cultural material, can be assigned to either a later variant of the Plains Woodland tradition or the Central Plains tradition. Sites illustrated in Figure 9.3, which contained few or no associated grave goods, are perhaps affiliated with the Valley focus (phase) of the Plains Woodland tradition. With the exception of distal fibula and patella, the percentage of elements recovered from site 25HN118 tends to correspond rather closely with those sites discussed by Phenice (1969) as having few associated cultural materials. This is particularly true for elements of the vertebral column and bones of the hand and foot.

As indicated by Figure 9.4 and as suggested throughout this discussion, burial customs practiced during the Valley focus differed from those of the Keith focus. In addition to the differences noted in the amount of cultural material associated with the burials, another major difference appears to be in the differential treatment of anatomical parts; particularly the vertebral column and bones of the hand and foot. As indicated in Figure 9.4, burial sites which are suggested to be affiliated with either the Keith focus or the Central Plains tradition have a higher percentage of cervical, thoracic and lumbar vertebrae compared to the Valley focus burials. Burial sites affiliated with the Keith focus of the Plains Woodland tradition and perhaps those of the Central Plains tradition also have a high frequency of hand and foot bones. This is somewhat

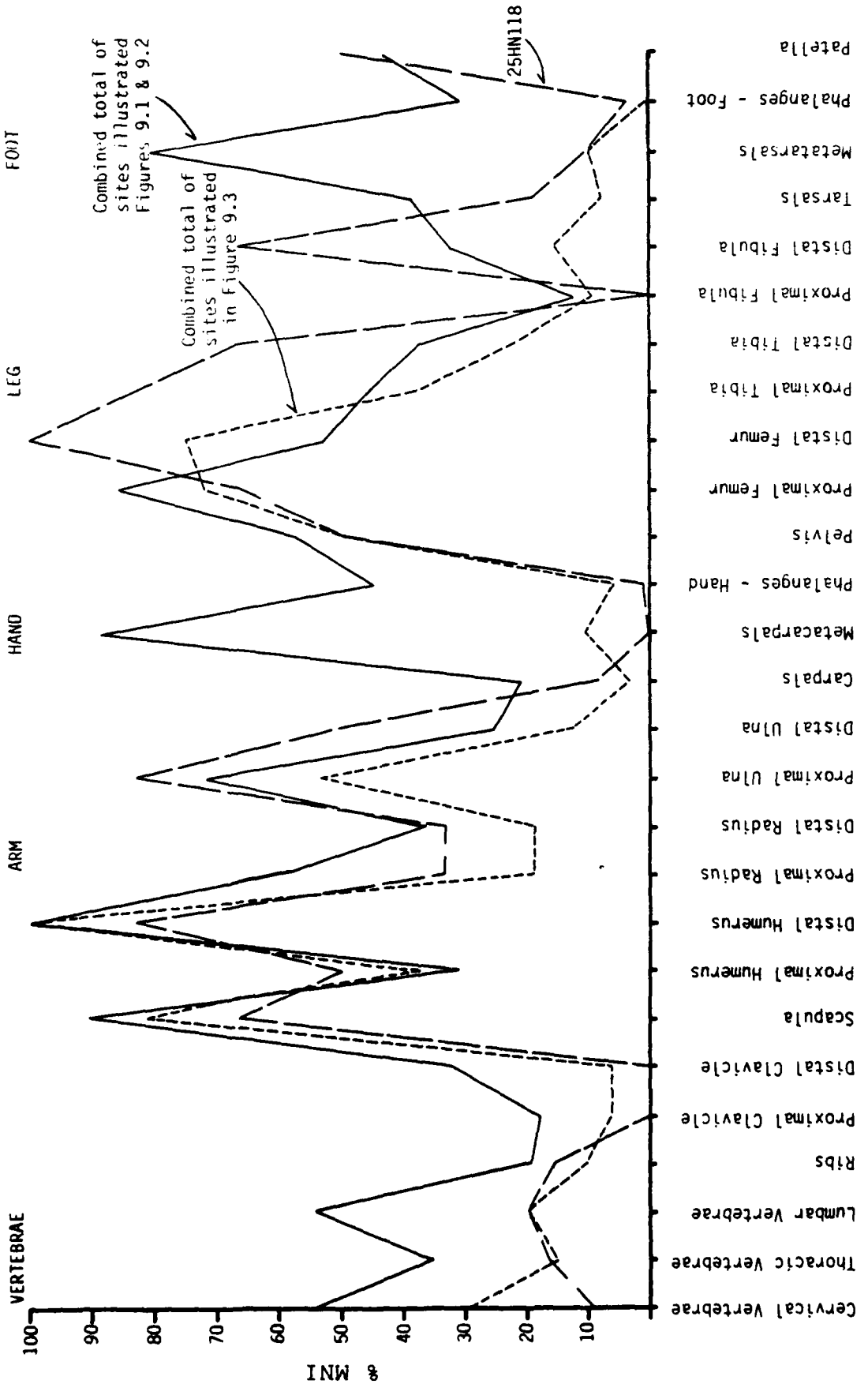

Figure 9.4. Comparative percentages of bone elements for the combined sample of sites illustrated in Figures 9.1 and 9.2, Figure 9.3, and site 25HN118.

supported by Plates 18b, 19a, 20a and 20b of the Woodruff Ossuary (Kivett 1953).

In contrast, sites such as Taylor Mound, Younkin 1, Younkin 3, A. Berry 1, Dixon and 25HN118 have a much lower frequency of vertebrae, hand and foot bones. Although further analysis of osteological materials from Central Plains burial sites is necessary, it is argued that frequencies of select skeletal elements may be a valuable means of determining affiliation of these burials. In order to test the hypothesis presented here, further analysis of the osteological materials from other Valley focus burial sites such as the DO-2, Bakenhus and Christensen Mounds could be undertaken. Also, as more information from the Grover Hand and Swift Bird Mounds, which Johnson (1973) has included within his description of the Valley variant, becomes available, the concept of the Valley focus mortuary practices presented here can be tested.

CHAPTER TEN

25HN174 COMPARISONS

In comparing the individual recovered from site 25HN174, attention has been given to cranio-metric observations. This has been done for two major reasons. First, osteological analysis (see Chapter Seven) has demonstrated that the individual recovered from 25HN174 does not exhibit typical Plains Indian skeletal traits. The suggestion has been made that this individual may, in fact, be representative of an earlier Plains Indian population in which Caucasian traits were more prevalent than previously considered. One of these traits is a high vault.

Second, because the skull is nearly complete, various cranio-metric observations were possible. Therefore, the present analysis attempts to document possible evolutionary trends characteristic of this earlier time period which are related to changes in the shape of the skull. In order to place the burial from 25HN118 in its proper perspective, it is first necessary to discuss one of the methods of cranio-metric study which has been used on Plains Indian skeletal material and to present the data available from various sites.

Recent literature has suggested an evolutionary trend in the reduction of head height through time. This appears to be true for the Northwestern Plains (Gill 1974, 1981; Gill and Clark 1983) as well as both the Middle Missouri and Central Plains subareas (Jantz 1977; Jantz and Willey 1983). Gill (1981:67) suggests that this lowering of cranial vault may have occurred "from at least Late Plains Archaic through Late Prehistoric and

Historic times." This qualification is significant in terms of the present study which attempts to document change in head height for early populations.

Jantz and Willey (1983) and Jantz (1977) present an index which is designed to reflect relative head height. This index, referred to as the auricular mean height index (AMHI) is defined by Jantz and Willey (1983:60) as:

$$AMHI = \frac{\text{Auricular height}}{(\text{Cranial length} + \text{breadth})/2} \times 100$$

Jantz and Willey (1983:61) go on to state:

> There are several reasons for utilizing an index constructed from vault height alone rather than basion-bregma height. An important practical reason is that more data are available because head height can be measured in crania where basion is missing, as is often the case. In addition it has recently been shown that vault height and base height vary independently and that vault height contributes more to intergroup differences in the Plains than does base height (Key 1982).

In their study, the two authors compare AMHI against time and latitude for their Central Plains-Caddoan and Middle Missouri-Mandan samples. "The results indicate that there is a lowering of AMHI through time, but, in general, latitude is not strongly related to AMHI" (Jantz and Willey 1983:63). The present study has drawn heavily from the information presented by Jantz and Willey (1983). However, in light of the results obtained by the earlier study, latitude has not been included in this analysis and both male and female AMHI are included.

It is apparent in the Jantz and Willey (1983) study that, while AMHI shows a decrease over the last 1800 years, it is unknown whether this is true for earlier populations. In fact, the opposite may be the rule since Jantz and Willey (1983:62) state "including the Woodland [age] material

reduces the rate at which AMHI decreases with time." The present study, which includes a much greater time span, examines changes in AMHI using skeletal materials which are either contemporaneous with or predate the Woodland sample described by Jantz and Willey (1983). In order to remain consistent, the present study will use similar types of analysis (i.e. regression) as those presented in the Jantz and Willey (1983) study.

The sample used in the present study was collected through a careful examination of the available published literature (Table 10.1). Only those descriptions which actually contained all three of the necessary measurements (i.e. maximum length, maximum breadth and auricular height) were used. For example, if auricular height was not given in the analysis, no approximation using basion-bregma or porion-bregma was attempted. This unfortunately lowered the sample but ultimately results in a more accurate one. Also, estimates using craniostat drawings or photographs were not attempted. The most serious disadvantage here was the elimination of Lansing Man (Bass 1973; Jantz 1977).

Rather than using a single average AMHI from multiple burial sites, all measurable skulls have been included. Because of this, some differences are apparent between the data presented here and those of Jantz and Willey (1983).

Skeletal materials from the Middle Missouri, Central Plains and southern two-thirds of the Northwestern Plains have been included in the study (Table 10.1). Only those remains which date to or predate what can be considered as the terminal portion of the Plains Woodland tradition (see Figure 3.2) were considered. Whenever possible, published absolute dates for the burials were used. These are indicated in Table 10.1. In such instances where absolute dates have been calculated for the site, the

Table 10.1. Middle Missouri, Central Plains and Northwestern Plains samples employed in analysis.

	Site	Date*	Source	AMHI	Sex	Source
MIDDLE MISSOURI	Medicine Crow 39BF2	Circa 4000	**	68.7	M	Bass (1976:699)
	Schmidt (Mound 1) 39MO20	Circa 1650	**	76.4	?	Jantz and Willey (1983:61)
	Swift Bird (Mound 2) 39DW233	1600 ± 100 (IsI-719)	Neuman (1975:45)	72.9	F	Bass and Phenice (1975:132)
	"	"	"	73.0	F	"
	"	"	"	71.3	M	"
	Grover Hand (Mound 1) 39DW240	650 ± 200 (SIN-167)	Neuman (1975:53)	73.1	F	Bass and Phenice (1975:120)
	"	"	"	70.1	M	Bass and Phenice (1975:119)
	"	"	"	72.1	M	"
	Williamson 14CF330	3600 ± 100 (GaK-407)	Schmits (1980:23)	78.8	F	Bass and Head (1980:180)
	Lewis Central School 13PW5	2815 ± 185 (UCLA-2105)	Anderson et al. (1978:195)	73.2	M	Anderson et al. (1978:199)
	"	"	"	67.9	M	"
	"	"	"	68.9	M	"
	"	"	"	72.9	M	"
	"	"	"	71.6	F	Anderson et al. (1978:200)
CENTRAL PLAINS	Young Site 14SC2	Circa 2000	**	69.6	F	Stewart (1959:677)
	"	"	**	70.1	F	"
	Taylor Mound 14DP3	1940 ± 140 (M-2343)	O'Brien (1971:176)	76.4	M	Klepinger and Bass (1971:186)
	25HN174	1600 ± 110 (Beta 10209)	In Text	77.4	M	In Text
	Curry Site 14GR301	1570 ± 240 (GaK-592)	O'Brien (1971:176)	75.3	?	Jantz and Willey (1983:61)
	Dixon 14GE7	Circa 1500	**	71.8	M	Phenice (1969:40)
	Woodruff Ossuary 14PH4	1339 ± 240 (C-928	Wedel (1959:619)	73.9	M	Jantz and Willey (1983:61)
	J. Younkin 14GE6	Circa 1000	**	82.4	M	Phenice (1969:40)

Table 10.1 (Continued). Middle Missouri, Central Plains and Northwestern Plains samples employed in analysis.

	Site	Date*	Source	AMHI	Sex	Source
NORTHWESTERN PLAINS	Gordon Creek 5LR99	9700 ± 250 (GX-0530)	Breternitz et al. (1971:170)	64.3	F	Breternitz et al. (1971:174)
	Dunlap-McMurry 48NA67	5350 ± 160 (RL-651)	Zeimens et al. (1978:19)	69.9	M	Gill (1981:58)
	Draper Cave 5CR1	3520 ± 170 (UGa-736)	Finnegan (1976:28)	69.9	M	Finnegan (1976:26)
	McKean 48CK7	3287 ± 600 (C-715)	Frison (1978:58)	69.0	F	Stewart (1954:459)
	Bradford House III 5JF52	2440 ± 185 (UGa-993)	Finnegan (1978:227)	67.1	M	Finnegan (1978:228)
	Torrington Skulls	Circa 2000	**	67.7	M	Howells (1938:321)
	Sand Creek burial	Circa 2000	**	72.9	M	Gill (1978:25)
	5JF211	1990 ± 240 (UGa-1621)	M. Finnegan pers. comm. (1984)	66.7	M	M. Finnegan pers. comm. (1984)
	Hutcheson Burial 5LR97	1805 ± 105 (GX-0531)	Breternitz (1969:118)	74.0	F	Wade (1966:76)
	Iron Jaw 24RB93	1790 ± 50 (TX-3066)	Gill and Clark (1983:191)	73.7	M	Gill and Clark (1983:195)
	14T0301	Circa 1500	Finnegan and Witty (1977:26)	67.5	M	Finnegan and Witty (1977:29)
	Gahagan-Lipe 5MR3	Circa 1500	Scott and Birkedal (1972:6)	70.0	F	Scott and Birkedal (1972:10)
	"	"	"	64.0	F	"
	-------	750 ± 90 (NWU-61)	Gill and Lewis (1977:68)	73.0	M	Gill and Lewis (1977:70)

* Date expressed in years before present

** Determination of relative dates explained in text

original excavation report was carefully examined. This resulted in some discrepancies between the dates presented here and those cited by other authors. For example, Jantz and Willey (1983:61), in citing Neuman (1975), give a date of 270 A.D. for the Grover Hand site. Since the measurable skulls were recovered from Mound 1 of the Grover Hand site (Bass and Phenice 1975:116-120), the date stated for Mound 1 by Neuman (1975:53) of A.D. 1300 ± 200 was used in the present study.

Obvious problems are apparent when no absolute dates are available. For example, site 14T0301, located in northwestern Kansas, was identified as Woodland and believed to date circa A.D. 500 (Finnegan and Witty 1977) based on the presence of a boatstone within the burial. However a burial site located in northeastern Colorado, 5JF52, which also contained a boatstone, was radiocarbon dated at 2440 ± 185 B.P. and described as Archaic (Finnegan 1978). For this study, the Finnegan and Witty (1977) estimate of circa A.D. 500 was used.

It was necessary to estimate the age of the skull from the Medicine Crow site, the Young burial site, the Torrington Skulls, the Sand Creek site, the Schmidt site, and the Dixon and J. Younkin mounds. For the Medicine Crow skull, the Young site, the Torrington Skulls and the Sand Creek site, ages were estimated after careful examination of published illustrations of the associated cultural materials. The potential age of the Medicine Crow skull and Young burial site have been discussed earlier.

Temporal affiliation of the Torrington Skulls has long been a problem. Howells (1938) placed considerable antiquity on the remains comparing them to "Minnesota Man." Gill (1974, 1981), however, has placed the Torrington skulls within the Late Prehistoric period. Agogino and Galloway (1963) analyzed the projectile points apparently associated with the Torrington skulls and concluded that these artifacts "represent a type commonly

distributed in late prehistoric and protohistoric cultural horizons in the northwestern Plains" (Agogino and Galloway 1963:109). Subsequent authors have interpreted this statement to mean Late Prehistoric period as defined by Frison (1978). Examination of the projectile points illustrated in Agogino and Galloway (1963:108) have lead the present authors to conclude that these projectile points are not diagnostic of the Late Prehistoric period. Rather, they compare favorably to projectile points illustrated in Frison (1978: Figure 2.9 and 5.40) which are diagnostic of the Late Plains Archaic. The present study has therefore associated the Torrington skulls with a date of circa 2000 B.P.

An estimated date has also been assigned to the Sand Creek burial, located in central Wyoming, an the basis of an associated projectile point. This projectile point, illustrated by Scoggin (1978:19), compares favorably to that illustrated in Frison (1978:Figure 5.40i). These large, corner-notched projectile points are diagnostic of the Late Plains Archaic period. An estimated date of 2000 B.P. has been assigned to the Sand Creek burial.

Neuman (1975) states that Mound 1 from the Schmidt site should be included within the Sonota Complex. The only skull which has all of the necessary measurements was recovered from Mound 1 of the Schmidt site. Neuman (1975:88) goes on to state that "this [Sonota] complex existed in the region sometime between the birth of Christ and A.D. 600." On the basis of the Neuman interpretation as well as those of Jantz and Willey (1983:61), an age of 1750 years B.P. is proposed for the Schmidt site.

Two other sites for which age estimates are given are J. Younkin (14GE6) and Dixon (14GE7). Phenice (1969:35) states that the J. Younkin site contained "artifacts assignable to Plains Woodland culture, but shows no evidence of relationships with the Central Plains phase." Dating the

Dixon site is also based on the description of cultural materials given in Phenice (1969). Phenice states that no ceramics were recovered but that the artifact assemblage suggests Plains Woodland affiliations. In light of the results presented earlier on the differences in burial practices between Valley and Keith focus sites, it is suggested that the Dixon site is affiliated with the Valley focus and the J. Younkin site is affiliated with the Keith focus. Therefore, an estimated date of 1500 B.P. has been assigned for the Dixon burial site and a date of 1000 B.P. for the J. Younkin site.

A scattergram of the individual data points from the three subareas is illustrated in Figure 10.1. Table 10.2 lists the sample size, slope, standard error, correlation coefficient and R^2 computed for each. Regression lines for the Middle Missouri, Central Plains, Northwestern Plains and the combined sample (excluding Gordon Creek) are illustrated in Figure 10.1. What is most important in terms of the present study is that the direction of slope is positive, whereas a negative slope is indicated in the Jantz and Willey (1983) study.

An increase in AMHI through time is indicated in Figure 10.1 for all three of the areas as well as for the combined sample. However, like Jantz and Willey (1983), there appears to be considerable variation around this slope and as demonstrated by the correlation coefficient and R^2 (Table 10.2), the strength of relationship between the variables of time and AMHI is very weak.

Only a mild degree of clustering along an upward sloping line is evident in Figure 10.1. In addition to only a moderate degree of association between the two variables as indicated in Table 10.2, three statistical problems are readily apparent. The first of these is due to the fact that we are dealing primarily with a truncated distribution of

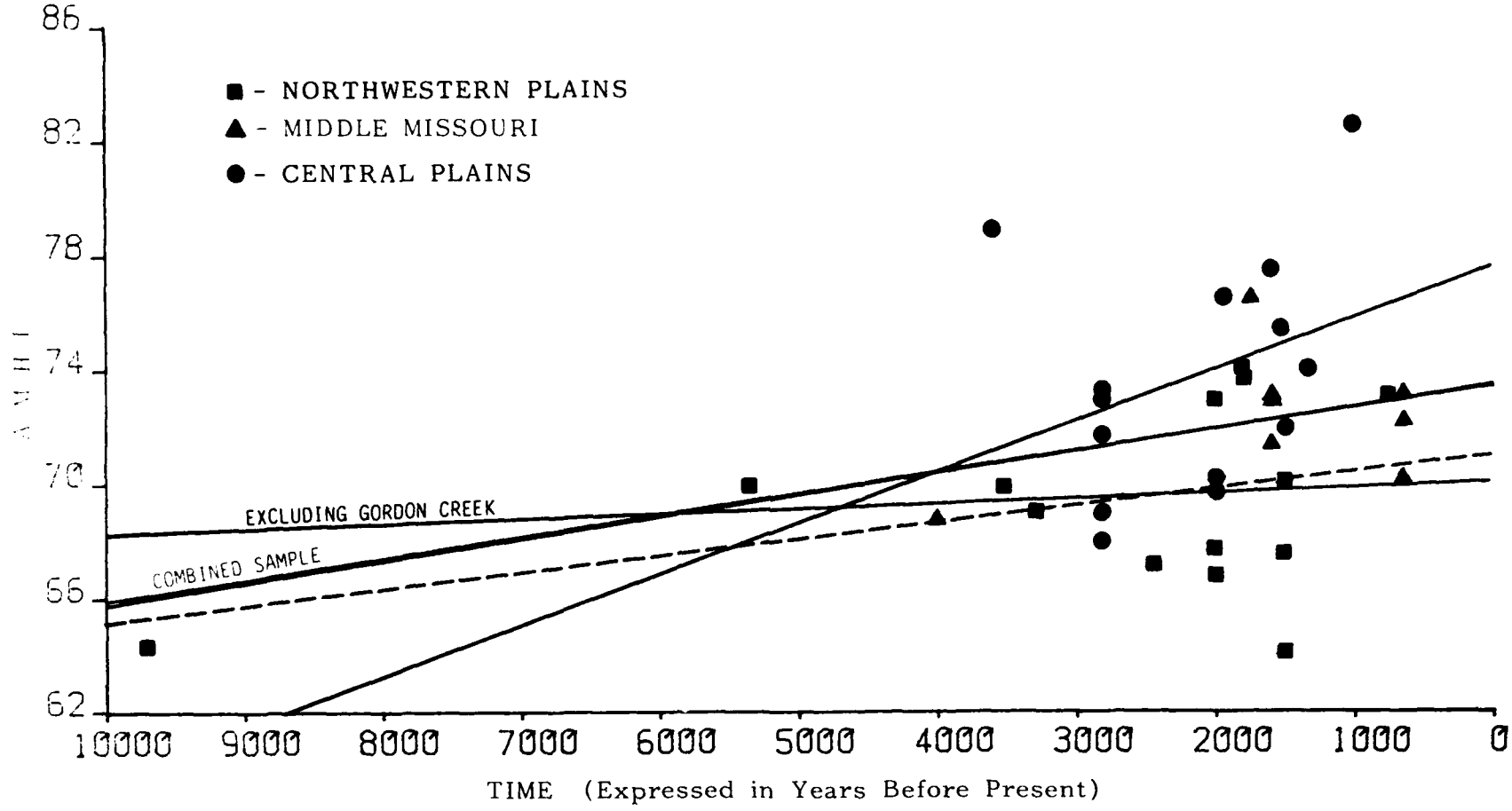

Figure 10.1. Scattergram showing the relationship between AMHI and time for the Central Plains, Middle Missouri, Northwestern Plains and the combined sample.

Table 10.2. Slope and statistical tests of the Middle Missouri, Central Plains, Northwestern Plains and combined samples.

	SAMPLE SIZE	SLOPE	STANDARD ERROR	CORRELATION COEFFICIENT	R^2
MIDDLE MISSOURI	8	.00077	2.31024	.36866	.1359
CENTRAL PLAINS	14	.00177	4.05212	.32594	.1062
NORTHWESTERN PLAINS	14	.00058	3.11825	.40718	.1657
NORTHWESTERN PLAINS (Excluding Gordon Creek)	13	.00017	3.20295	.06540	.0042
COMBINED SAMPLE (Excluding Gordon Creek)	35	.00075	3.72077	.20588	.0423

data points. The vast majority of points occur along the X-axis (TIME) from approximately 4000 to 1000 years B.P. It is therefore impossible to make any statistically meaningful statements concerning changes in AMHI over the last 10,000 years as could be misinterpreted from the regression lines illustrated in Figure 10.1. However, the slope calculations included in Table 10.2 were computed using only the actual sample dates. The regression lines for the Central Plains, Middle Missouri, and combined sample (excluding Gordon Creek) were plotted using the X and Y intercept calculated for the actual sample and have merely been projected towards the Y axis in Figure 10.1. Again, what is important in Figure 10.1, is the direction of slope and the comparison of this to the Jantz and Willey (1983) study.

Another situation which should be noted is the presence of a single data point from the Northwestern Plains sample at 9700 years B.P. (Gordon Creek). The effect which this outlier has is two-fold. First, it tends to treat the Northwestern Plains and combined samples as a continuous rather than truncated distribution of data points. Statistical techniques applied to these two samples assume a continuous distribution along the X-axis and the correlation coefficient may therefore be exaggerated. Also, the effect which this outlier has on the regression line could be greatly accentuated. In order to detect the effect which this outlier has on the Northwestern Plains and combined samples, data from the Gordon Creek were eliminated and a separate statistical computation was run for the Northwestern Plains sample (see Table 10.2). A separate regression line for the Northwestern Plains without Gordon Creek is also illustrated in Figure 10.1.

The effects of including the outlier are variable. Although the correlation coefficient and associated R^2 were reduced as a result of

removing Gordon Creek from the sample base, standard error remained the same and slope remained positive.

Finally, the problem of sample size is apparent (see Table 10.2). While sample error cannot be controlled for, it is important to note that all three of the sample areas and the combined sample exhibit positive slopes. That is, as X becomes larger (increase in time), Y (AMHI) also increases. This is particularly true of the Middle Missouri and Central Plains samples. Although the addition of more points may effect the degree of slope, it appears that the general direction of the slope should remain the same. A lack of change in the overall direction of slope with the inclusion or exclusion of the Paleoindian Gordon Creek skull seems to further strengthen this argument.

Although there appears to be considerable variability between the variables of time and AMHI, tentative results indicate that from approximately 10,000 years to 1,000 years B.P., there was a gradual increase in AMHI. This does not necessarily disagree with the results of earlier studies. Gill's (1981) statement implies that although a lowering of head height occurred within the last 1000-2000 years, a different trend may have occurred prior to this time. Also, the apparent inconsistency noted by Jantz and Willey (1983) for crania recovered from the Medicine Crow site and the Lewis Central School site are explainable by the results presented here. These crania, "are characterized by low vaults. The Medicine Crow cranium is lower than many of the much later Middle Missouri crania." (Jantz and Willey 1983:65). All of these crania, particularly the Medicine Crow specimen, represent older material than the majority of the Jantz and Willey sample. Therefore, given the results of the present study, it is conceivable that the AMHI would also be lower than many of the later Woodland crania (circa 1,000 B.P.).

Returning to the problem of truncated distributions, it is suggested that analysis of any major evolutionary trend is severely altered by the time depth employed. As this type of study increases in time depth, the problem of achieving a uniformly distributed, representative sample of earlier materials becomes a major consideration. If a sufficient sample covering the last 12,000 years was available, a totally different trend or series of alternating trends in AMHI might be evident. Rather than a linear relationship between AMHI and time, a curvilinear or some other form of nonlinear relationship may in fact be more characteristic.

What is suggested here, based on the limited available data, is that AMHI, which is designed to reflect relative head height, actually increased from approximately 5000 years to 1000 years B.P. This increase may have also been characteristic of a much longer period of time (approximately 10,000 to 1,000 years B.P.); however sample size is far to small to make any valid statements concerning trends throughout this length of time. Based on the results obtained by Jantz and Willey (1983), Jantz (1977), Gill (1974, 1981), and Gill and Clark (1983), a reversal of this trend began approximately 2000 years ago. During this more recent time period, it appears that a lowering of AMHI occurred.

No explanations are offered at this time regarding causation of the apparent reversal in AMHI. In fact, it must first be demonstrated that such a reversal actually occurred. If this reverse trend is actually proven to be the case, then further investigations might attempt to explain this as a result of changes in climate, dietary habits, gene flow or a combination of these. Such investigations should begin by examining changes in dietary habits primarily because the methodology for such studies is already available (i.e. Tieszen 1983).

CHAPTER ELEVEN

C_3 - C_4 ANALYSIS

Introduction

Knowledge of the photosynthetic process and ecological importance of several photosynthetic pathways has increased within the last twenty years. Some basic information on photosynthesis is required in order to understand ecological and then archaeological implications.

Photosynthetic processes are divided into light reactions and dark reactions. Light reactions convert light energy into chemical energy and are commonly found in all higher vascular plants. In dark reactions, light is not required to convert carbon dioxide into sugars and starches. Carbon (C) in the form of carbon dioxide (CO_2) is important in photosynthetic pathways. Carbon is an energy source and a building block element for further chemical reactions within the plant. Carbon may be used in more than seven different pathways. The main concern here will be with C_3, C_4, and Crassulacean acid metabolism (CAM) plants. All of these pathways are ecologically significant.

C_3 (Calvin cycle) produces phosphoglyceric acid (PGA) with a skeleton of three carbon atoms. The cycle is autocatalytic which is to say it will continuously build up the concentration of its own intermediates and rate of its reaction. This is important because it permits a simple and fast regulation of photosynthetic rates. Due to the regulation of the rate of photosynthesis there is a lack of need of complex mechanisms to supply

required intermediates during nonoperation. Also autocatalysis allows photosynthesis to get quickly to high speed when conditions are right.

The C_4 (Hatch-Slack) pathway is more complex than the C_3 pathway. Four carbon molecules are involved with energy production and several extra chemicals are involved in C_4 cycling. The cycle appears to trap CO_2 in certain leaf cells and then pass CO_2 in the form of the B-carboxyl of a C_4 acid. This acid form is then released as CO_2 to be fixed and reduced by the C_3 pathway. Partly because of this type of cycling, plants with C_4 cycles are able to absorb CO_2 more efficiently at low CO_2 levels. The C_4 cycle is stopped because of darkness or lack of CO_2. This is not a serious drawback since an energy pool in the C_3 cycle of C_4 plants can be used to prime the C_4 cycle.

CAM (Crassulacean acid metabolism) is often overlooked in the C_3 - C_4 studies. CAM plants are found in both C_3 and C_4 plant habitats. Some C_3 plants can change cycles from C_3 to CAM which has a cycle close to the C_4 pathway. Changes occur when drier conditions form and C_3 plants are not able to have an effective production of energy. Research to date indicates only a few C_3 species capable of doing this change. Most CAM plants are succulents such as prickly pear (Opuntia).

As stated in Tieszen et al. (1979:352):

> One of the characteristics which distinguishes C_3 from C_4 plants is the fractionation against the stable heavy isotope, ^{13}C. C_4 plants possess a delta^{13} C value of approximately -12.5, whereas C_3 plants show a greater discrimination and possess a delta^{13}C value of about -26.5 to -28 (Smith and Brown, 1973; Smith and Turner, 1975; Troughton and Card, 1975). These values are not constant and are slightly dependent upon certain environmental variables.

Boutton et al. (1983:1) also state:

> ...plants with the C_3 pathway of photosynthesis have stable carbon isotope ratios ranging from -21 to -33o/oo vs PDB, while plants with the C_4 photosynthetic pathway have stable carbon isotope

ratios ranging from -9 to -17‰ vs PDB (Smith and Epstein, 1971).

Plants can not be easily categorized into C_3, C_4, or CAM plants by families only. There are many cases of plant families having both C_3 and C_4 species in them. Also, some species have been found to be intermediates of the cycles. This means a species can have characteristics of both C_3 and C_4 cycles. Ecological interpretation is thus made more difficult.

C_3 plants are more successful, widespread, and are found in all major climates. This pathway is found from algae to higher plants. There is not any typical habitat pattern where C_3 plants are found. One C_3 desert plant, Camissonia claviformis, is the most energy efficient plant found. The optimum temperature is 20° C to 30° C for C_3 pathway plants.

C_4 pathway is found only in flowering plants. The habitat is open, warm and saline. C_4 plants may be considered as primary succession types. They are usually annuals which are short lived but produce many offspring. A higher optimum growth temperature of 30° C to 45° C is required. Drought resistant plants are usually C_4 cycle plants. Many Poa species are included in this group.

Plants with C_4 cycles may have evolved from C_3 ancestry. These plants evolved primarily in the tropics where water conservation was needed. This adaptation would favor the C_4 cycle since C_4 plants can efficiently use light intensities that would be wasted on C_3 plants.

Ecological studies show C_4 plants decrease in biomass as elevation increases. More C_4 plants are found, in plains habitats, in July and August than C_3 plants. Several other basic, but by no means strict variables, are C_4 plants have a maximum photosynthetic rate at higher leaf temperatures and higher levels of irradiance. Also, they maintain higher ratios of dry weight accumulation to water loss. This does not mean that

higher productivity is found in C_4 plants. However, there is a correlation with minimum daily temperatures during the growing season.

Productivity differences between C_3 and C_4 species have been determined. Some C_4 crops such as corn and sugarcane are among the most productive in the world. So statements have been made that C_4 plants are more productive than C_3 plants. But C_3 crops such as sunflower, wheat, potato, and soybeans are as or more productive than many C_4 crops. The main advantage of the C_4 syndrome appears to be the ability to maintain high photosynthetic rates under conditions of water shortage during which C_3 plants could not operate photosynthesis.

Archaeological Implications

Isotope ratios of C_3 and C_4 is an important tool for archaeological research. There is a potential to help reconstruct dietary habits. Paleoclimate reconstructions can be aided by trying to determine past vegetational sequences through the use of these ratios.

However, there are problems and gaps in knowledge which researchers should be aware. Rate of turnover of bone collagen is one such problem. Boutton et al. (n.d.), among others, have looked into this problem. They state biochemicals are being broken down and resynthesized all the time. Broken down products are reassembled with other products and with recently acquired nutrients. This mixing results in fluctuations in the isotopic composition. Therefore, accurate isotopic composition for archaeological studies cannot be measured. A general idea of diet composition can be made but other factors must be studied to supplement the results.

Reconstruction of past vegetation through the use of C_3 - C_4 studies can increase the knowledge of past ecosystem composition. However, several pathways of investigation must be conducted. Bone collagen turnover has

several drawbacks for testing of past vegetation. Many studies show grazing preference for C_3 plants by most herbivores. C_4 plants may have been present but not chosen for food. Phytoliths could be included to find a better outlook on vegetation composition. Also pollen analysis may be included for further verification of data. Again, there are drawbacks to the use of C_3 - C_4 studies as the only means of reconstruction of past ecosystems.

Finally, regions of the country did and presently have different vegetational composition due to climate patterns. A danger is to compare one regions, such as Arkansas, with a high plains area. A person cannot compare regions of drier and warmer conditions with vegetation found in wetter conditions. Composition and succession of C_3 and C_4 plants will be different. Knowledge of ecology is needed to make statements of grazing patterns and climates.

Analysis and Interpretations of Sites 25HN118 and 25HN174

Samples of bone associated with individuals #1 and #3 from site 25HN118 and from the single individual recovered from site 25HN174 were submitted to Dr. Larry L. Tieszen, Professor of Biology, Augustana College for C_3 - C_4 analysis. A single bone sample was submitted from each of the individuals recovered from site 25HN118. Two samples were submitted from the individual recovered from site 25HN174 and these samples were analyzed separately. Tne results of this analysis are presented in Table 11.1.

The results suggest that both C_3 and C_4 plants were being utilized in the dietary habits of all three individuals. The slightly higher readings obtained from the individual at site 25HN174 indicate that C_4 plants were utilized to a greater extent. This could be do to C_4 plants being eaten either directly by humans or indirectly by eating animals which grazed on

C_4 plants. As stated in Tieszen's (1984) lab report, this "may reflect some maize in the diet or, alternatively, more arid conditions--assuming Bison is a main component of the diet." Given the age of the burial, the suggestion that maize was being eaten seems unlikely. Also, studies conducted by Boutton et al. (n.d.) suggest values of -10.4 to -15.8 for substantial maize consumption.

Table 11.1. Results of carbon isotope analysis of bone samples submitted from archaeological sites 25HN118 and 25HN174.

Sample	13_C
Site 25HN118, Individual #1	-24.03
Site 25HN118, Individual #3	-23.1
Site 25HN174, Individual #1; Sample #1	-21.7
Site 25HN174, Individual #1; Sample #2	-18.6

Several hypotheses can be suggested. One is a drier climate which would aid C_4 intrusions and migration into the area. If more C_4 plants are in an area than the chances of being eaten either directly or indirectly by man are increased. Results showing a human individual with a higher C_4 isotope ration in the bones would indicate this possibility. Individuals with bone samples containing more negative isotope ratios could indicate cooler and wetter conditions or selective eating of C_3 type plants. These differences may also be explained as seasonal variation in dietary habits and seasonal variation in the availability of food resources.

As a final note, it should be stated that there are apparent problems with the analysis as exemplified in the differences in ratios obtained from the two samples submitted from site 25HN174. The difference between these two readings is greater than the difference between the higher of these two readings and the readings obtained from site 25HN118.

CHAPTER TWELVE

SUMMARY AND RECOMMENDATIONS

The preceding chapters have described, in detail, the cultural and osteological material recovered from sites 25HN118 and 25HN174. The methodology employed in analyzing these materials and the interpretations based on the results of these analyses have also been presented. This chapter will attempt to briefly summarize the findings and explain the significance of sites 25HN118 and 25HN174.

Three adult females of various ages and one juvenile are represented in the osteological material recovered from 25HN118. No absolute dates were calculated for this site. However, it is suggested that the burials present at 25HN118 are affiliated with the Valley focus (phase) of the Plains Woodland tradition. This assumption is based on the types and amounts of cultural and osteological material recovered from the burials. It appears that Valley focus mortuary practices are characterized by the inclusion of few burial goods and the consistent under representation of certain skeletal elements, primarily bones of the hands and feet, and to a lesser extent, elements of the vertebral column. In contrast, burials assigned to the later Woodland manifestations (i.e. Keith focus) contain abundant grave offerings. Bones of the hand and foot appear to be well represented, and although the vertebral column is somewhat underrepresented, thoracic and lumbar vertebrae are consistently more common in these later burials than in burials assigned to the Valley focus.

This pattern seems to be true for the Taylor Mound (Valley focus) and Woodruff ossuary (Keith focus). More detailed analysis of osteological remains recovered from other documented Woodland burials is necessary in order to substantiate this hypothesis. Also, adequate dating of the burials discussed by Phenice (1969) would provide additional data concerning differences in mortuary practices.

The remains of an individual male were recovered from site 25HN174. The age of this individual at the time of death was perhaps in excess of 65 years. The abnormally high frequency of what are typically considered Caucasoid skeletal traits (both metric and non-metric) present an interesting situation and initially led the authors to suggest that this individual is either an early Euro-american explorer or is, in fact, representative of a prehistoric Plains Indian population. The radiocarbon date obtained from the burial supports the latter.

Previous to the results of radiocarbon analysis, it was suggested, on the basis of archaeological evidence, that this burial is affiliated with a Plains Archaic tradition. This suggestion was based on the stratigraphic position of the burial and similarities between this and other documented Archaic burials. Subsequent to the original analyses and interpretation, a radiocarbon date of 1600 ± 110 years before present (Beta 10209) has been calculated for the burial. In terms of the cultural sequence proposed for the Central Plains (i.e. Wedel 1961:280) the burial would be temporally affiliated with the Plains Woodland complex. However, in terms of burial practices, site 25HN174 is generally characteristic of the "Archaic burial mode" as defined by Oothoudt (1976:160):

> Across central and eastern North America, there was a general, but not universal Archaic burial mode pattern that remained in practice from 8000-7000 B.C. on into Late Woodland episodes in various regions. This pattern is seen from many sites as flexed simple interments in subsurface pits. There is no

specific orientation to the skeletons in the general pattern, but in some sites skulls may be oriented to a cardinal point.

The burial at 25HN174 appears to be an example of this Archaic burial pattern which continued to approximately 1600 B.P.

Analysis of AMHI indicates that there was an increase in head height from approximately 5000 to 1000 years B.P. Based primarily on the results of Jantz and Willey (1983) and Gill (1981), a reversal in this trend may have occurred within the last 1000 years.

A larger sample size is necessary in order to substantiate this apparent increase in head height. Additional data could be obtained if the necessary cranio-metric observations (maximum length, maximum breadth and auricular height) were available from Lansing Man (Bass 1973), as well as the crania recovered from the Bisterfeldt Potato Cellar site (Mattes 1965), Kirwin Reservoir (Bass et al. 1967), the Massacre Canyon site (Kivett 1952), the Witkin burial (Swedlund and Goodman 1966) and the Doyle site (Weinker 1980). Absolute dating of several of the burials used in the analysis presented here would also be of great value in determining variation in head height.

The research potential for sites 25HN118 and 25HN174 is primarily dependent upon whether or not additional osteological remains are present. In the case of site 25HN118, it appears that additional human remains are present (Ellen Cummings, personal communication) and that further investigation of the site would yield information important to the prehistory of the region. The site is therefore believed to be eligible for nomination to the National Register of Historic Places.

It is more difficult to substantiate whether or not additional osteological or cultural materials are present at site 25HN174. As previously stated, the burial at 25HN174 compares favorably with the

Archaic burial pattern as described by Oothoudt (1976) and the Colorado Plains Woodland Mortuary Complex as defined by Breternitz and Wood (1965). Therefore, it seems probable that additional osteological materials may be present at 25HN174, as was the case at the Young site (Wedel 1959), 14JW303 (Finnegan n.d.b), the Williamson site (Schmits 1980), the Lewis Central School site (Anderson et al. 1978), the Turin burial (Anderson et al. 1980), the Bisterfeldt Potato Cellar site (Mattes 1965), the Gering and Dry Lake burials (Oothoudt 1976), the Hutcheson site (Wade 1966), Hazelton Heights (Buckles et al. 1963), the Gahagan-Lipe site (Scott and Birkedale 1972) and 5JF211 (Finnegan personal communication). Often, these burials are located in small pits separated by some distances (c.f. Scott and Birkedale 1972; Oothoudt 1976; Wedel 1959). A similar situation may be present at site 25HN174. However, single burials are also reported for the Dunlap-McMurry site (Zeimens et al. 1978), Draper Cave (Finnegan 1976), Bradford House III (Finnegan 1978), Witkin burial (Swedlund and Goodman 1966) and site 14RY302 (Bass and Willey 1966). If it can be demonstrated that additional human remains are present at 25HN174, then this site should also be considered eligible for nomination to the National Register of Historic Places.

It would seem, based on the above discussion as well as the fact that site 25HN118 is presently inundated, that the most prudent recommendation is periodic monitoring of both sites. For site 25HN174, monitoring, or site visits, should be conducted periodically, perhaps by local Corps of Engineers employees. Due to the rapid erosion along the edges of the reservoir, it is recommended that this monitoring be conducted monthly. For 25HN118, it is recommended that the area be reinvestigated during periods of low lake elevations. If the site is to remain above water for any length of time, then additional excavation should be completed. This

should minimally include documenting the presence and extent of additional materials. If additional materials are present at either sites, then impacts to these sites (i.e. recreation, wave action, shoreline erosion, etc.) should be mitigated, either through excavation or preservation.

GLOSSARY

Accelerator Dating Technique (AMS): A recently developed carbon-14 dating technique which makes it possible to date very small amounts of organic material through the use of a mass spectrometer.

Archaic: A term applied to cultural traditions which are more recent than Paleoindian but older than the Late Prehistoric. These cultural complexes are believed to have subsisted on a wide variety of nondomesticated plant and animal resources.

Auricular Mean Height Index (AMHI): An index developed to measure the height of the human skull through the use of maximum length, maximum breadth, and auricular height.

Boatstone: A problematical groundstone artifact which may have functioned as an atlatl weight.

Central Plains Subarea: That portion of the Great Plains east to west from the Missouri River to the Rocky Mountains and north to south from the Niobrara River to the Upper Arkansas River Basin.

Dismal River: A Late Prehistoric period cultural manifestation which is believed to relate to Plains Apache occupation of the area.

Femoral Platymeria: Anterior to posterior flattening of the human femur. This trait is used as a diagnostic tool to assist in the determination of racial identity of skeletal remains.

Giles and Elliot Formulae: Discriminant function analyses used to determine sex based on a series of measurements of the human skull.

Great Plains (or Plains): A semiarid area of North America east of the central Rocky Mountain chain, west of the Mississippi-Missouri Valley, south of the Saskatchewan River and continuing south into west-central Texas.

Head Height: A term used to describe the appearance of the cranial vault of the human skull.

Keith Focus (Phase): A Plains Woodland cultural phase which was present in certain regions of the Central Plains and is believed to have been in existence from approximately A.D. 400 to A.D. 800.

Loess Plains Region: The tall grass and mixed grass prairies of southern Nebraska and north-central Kansas.

Middle Missouri Subarea: The cultural and physiographic portion of the Great Plains which includes those portions of the Missouri River Valley from approximately and Montana-North Dakota border to the South Dakota-Nebraska border.

Midwest Taxonomic System: A classificatory system for archaeological materials developed in the 1930's. This system stresses content similarities between various assemblages but is not intended to demonstrate processual, time-space relationships.

Non-metric Traits: Attributes of a human skull or other part of the body which are not measurable but which are observable and may be indicative of the race, sex or age of the individual.

Northwestern Plains Subarea: That portion of the Great Plains which includes western North Dakota, western South Dakota, those portions of Alberta and Saskatchewan south of the Saskatchewan River, north-central Colorado and all of Montana and Wyoming.

Osteological Material: Any or all portions of the skeletal system which are non-cartilaginous.

Paleoindian: The time period and cultural tradition which represent the earliest conclusive evidence of man in North America. These groups have been traditionally thought of as the specialized hunters of mammoth and bison at the end of the last continental glaciation.

Percent MNI: A method of counting bones which first calculates the minimum number of individuals represented by each bone element and then scales all of these counts against the most frequent type of bone in the assemblage.

Phase: An archaeological unit within the Willy and Phillips system "possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether or the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time" (Willy and Phillips 1958:22).

Plains Village Tradition: An archaeological tradition in the Central Plains, Southern Plains and Middle Missouri subarea which came after the Plains Woodland and is characterized by earth lodge villages, a high degree of reliance of horticulture and a fairly sophisticated ceramic assemblage.

Plains Woodland Tradition: An archeological tradition on the Plains which, among other characteristics, is believed to have introduced the first ceramics and the use of horticulture to the area.

Prairie Peninsula: The grasslands which extend between the eastern woodlands of North American and the Missouri Valley.

Scoring: Tooth marks on bones which is the result of either turning the bone against teeth or dragging the teeth across the bone.

Southern Plains Subarea: That portion of the Great Plains which includes Oklahoma, Texas, southeastern Colorado, southern Kansas and eastern New Mexico.

Tradition: A taxonomic unit within the Willy and Phillips system which is "a (primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms" (Willy and Phillips 1958:37).

Trotter and Gleser Formulae: Several means of determining the living stature of an individual by measuring the length of human long bones.

Valley Focus (Phase): A Plains Woodland cultural phase which occurred in many regions and is believed to have existed from approximately 50 B.C. to A.D. 400.

Variant: A taxonomic unit which has been added to the Willy and Phillips system by some investigators in the Central Plains and Middle Missouri subareas and is intermediate in scope between the phase and the tradition.

Willy and Phillips System: A taxonomic system for archaeological remains which takes into account temporal and spatial relationships as well as the fact that archaeological units may not be entirely distinct from one another.

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PERSONAL COMMUNICATION

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APPENDIX A

OSTEOLOGICAL MATERIAL RECOVERED FROM SITE 25HN118

LEGEND

CAT# : Catalog Number

SQ : Square
- A0 = Surface, Site 25HN118
- A1 = Square #1, Site 25HN118
- A2 = Square #2, Site 25HN118
- A3 = Square #3, Site 25HN118
- A4 = Square North of Square #2, Site 25HN118
- A5 = Square West of Square #1, Site 25HN118
- A6 = Unknown Provenience, Site 25HN118

I : Individual
- 0 = No Specific Individual
- 1 = Individual 25HN118-1,
- 2 = Individual 25HN118-2,
- 3 = Individual 25HN118-3,
- 4 = Individual 25HN118-4,

CODE : Description of Bone Element or Unit
- AX = Axial Skeleton
- CP = Carpal
- CV = Clavical
- DE = Dentition
- FB = Fibula
- FM = Femur
- FR = Fragment
- HM = Humerus
- LU = Lumbar Vertebra
- MC = Metacarpal
- MT = Metatarsal
- PH1 = Proximal Phalanx
- PH2 = Medial Phalanx
- PH3 = Distal Phalanx
- PL = Patella
- PV = Pelvis
- RB = Rib
- RD = Radius
- SA = Sacrum
- SC = Scapula
- SK = Skull
- SN = Sternum
- TA = Tibia
- TR = Tarsal
- TU = Thoracic Vertebra
- UL = Ulna

SIDE : Side
- AX = Axial
- L = Left
- R = Right
- U = Unsided

SCODE : Additional Description of Element
- C = Complete
- CM = Calcaneus
- D = Diaphysis
- FR = Fragment
- IL = Ilium
- IS = Ischium
- MR = Molar
- MX = Maxilla
- N = Proximal
- PB = Pubis
- Q = Distal
- SA = Sacrum
- TL = Talus

MEAS : Measurable
- NO = No Measurements Taken
- YES = Measurements Taken

CAT#	SQ	I	CODE	SIDE	SCODE	MEAS
1.	52	A2	0	AX	AX	FR	NO
	ONE FRAGMENT OF A LUMBAR VERTEBRA AND 6 FRAGMENTS OF THORACIC VERTEBRAE						
	TOTAL WEIGHT OF 21 GRAMS						
2.	164	A2	0	CP	R	FR	NO
	PORTION OF RIGHT CUBOID						
3.	41	A2	0	CP	L	C	NO
	LEFT CAPITATE						
4.	160	A5	0	CP	L	FR	NO
	ONE FRAGMENT OF A LEFT HAMATE						
5.	78	A5	0	CP	L	C	NO
	COMPLETE LEFT HAMATE						
6.	88	A5	0	CP	U	FR	NO
	FRAGMENT OF AN UNIDENTIFIED CARPAL						
7.	26	A1	0	DE	U	MR	NO
	LOWER MOLAR						
8.	77	A5	0	DE	L	MR	NO
	FIVE LOWER MOLARS						
9.	6	A0	0	FB	U	D	NO
	UNSIDED FIBULA SHAFT FRAGMENT, 8.5 CM LONG						
10.	67	A3	0	FB	U	D	NO
	UNSIDED DIAPHYSIS OF A FIBULA, 5.0 CM LONG						
11.	27	A1	0	FR	U	FR	NO
	FOURTEEN UNIDENTIFIED LONG BONE FRAGMENTS, 13 GRAMS						
12.	53	A2	0	FR	U	FR	NO
	NINETY UNIDENTIFIED SMALL FRAGMENTS, TOTAL WEIGHT OF 90 GRAMS						
13.	73	A3	0	FR	U	FR	NO
	17 SMALL UNIDENTIFIED BONE FRAGMENTS TOTAL WEIGHT OF 14 GRAMS						
14.	57	A4	0	FR	U	FR	NO
	14 UNIDENTIFIED SMALL BONE FRAGMENTS, TOTAL WEIGHT OF 6.0 GRAMS						
15.	87	A5	0	FR	U	FR	NO
	27 UNIDENTIFIED SMALL BONE FRAGMENTS, TOTAL WEIGHT OF 17 GRAMS						
16.	103	A6	0	FR	U	FR	NO
	50 UNIDENTIFIED SMALL BONE FRAGMENTS, TOTAL WEIGHT 40 GRAMS						
17.	4	A0	0	HM	U	N	NO
	UNSIDED HUMERUS HEAD FRAGMENT						

	CAT#	SQ	I	CODE	SIDE	SCODE	MEAS
18.	29	A2	0	HM	L	N	NO
	FRAGMENT OF THE PROXIMAL HEAD OF A LEFT HUMERUS, MAY BE PART OF 25HN118-28						
19.	25	A1	0	LU	AX	FR	NO
	LUMBAR VERTEBRA						
20.	161	A3	0	LU	AX	FR	NO
	ONE FRAGMENT OF LUMBAR VERTEBRA						
21.	171	A2	0	MT	U	Q	NO
	DISTAL FRAGMENT OF METATARSAL						
22.	59	A3	0	MT	U	Q	NO
	DISTAL PORTION OF A METATARSAL						
23.	68	A3	0	MT	R	N	NO
	PROXIMAL PORTION OF A FIFTH METATARSAL, RIGHT SIDE						
24.	14	A1	0	PH1	U	C	NO
	PROXIMAL HAND PHALANX						
25.	38	A2	0	PH1	U	C	NO
	PROXIMAL TOE PHALANX						
26.	39	A2	0	PH1	U	C	NO
	PROXIMAL HAND PHALANX						
27.	64	A3	0	PH1	U	C	NO
	PROXIMAL HAND PHALANX						
28.	8	A0	0	PV	R	IL	NO
	THREE SMALL FRAGMENTS OF A RIGHT ILIUM, EACH APPROXIMATELY 3.0 CM LONG						
29.	12	A1	0	PV	L	IS	NO
	LEFT PELVIS FRAGMENT INCLUDING PORTION OF THE ACETABULUM AND ISCHIUM						
30.	15	A1	0	PV	U	PB	NO
	UNSIDED PUBIS FRAGMENT, POSSIBLY RIGHT						
31.	46	A2	0	PV	L	IL	NO
	POSTERIOR LEFT ILIUM FRAGMENT						
32.	169	A2	0	PV	U	IL	NO
	FRAGMENT OF ILIUM						
33.	167	A2	0	PV	U	FR	NO
	FRAGMENT OF ACETABULUM						
34.	44	A2	0	PV	L	IL	NO
	FRAGMENT OF A LEFT ILIUM						

CAT# SQ I CODE SIDE SCODE MEAS

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35. 55 A4 0 PV U SA NO
TWO SMALL FRAGMENTS OF A SACRUM, ONE IS A PORTION OF THE ILLIAC CREST, THE OTHER APPEARS TO BE A FRAGMENT OF ILIUM, TOTAL WIEGHT IS 11 GRAMS

36. 40 A2 0 RB U FR NO
51 UNSIDED RIB FRAGMENTS, 46.5 GRAMS

37. 72 A3 0 RB U FR NO
10 UNSIDED RIB FRAGMENTS, TOTAL WEIGHT OF 16.5 GRAMS

38. 56 A4 0 RB U FR NO
TWO UNSIDED SMALL RIB FRAGMENTS, TOTAL WEIGHT OF 4.5 GRAMS

39. 85 A5 0 RB L N NO
PROXIMAL PORTION INCLUDING ARTICULAR SURFACE OF A LEFT FIRST RIB

40. 86 A5 0 RB U FR NO
18 UNSIDED RIB FRAGMENTS, TOTAL WEIGHT IS 37.5 GRAMS

41. 163 A6 0 RB U FR NO
FRAGMENT OF FIRST RIB

42. 7 A0 0 RD U D NO
UNSIDED RADIUS SHAFT FRAGMENT, 3.0 CM LONG

43. 45 A2 0 SA AX N NO
FRAGMENT OF A SACRUM, ARTICULATES WITH SPECIMEN 25HN118-46

44. 172 A2 0 SC U FR NO
FRAGMENT OF AUXILLARY BORDER OF A SCAPULA

45. 166 A2 0 SC R FR NO
GLENOID OF RIGHT SCAPULA

46. 165 A2 0 SC L FR NO
FRAGMENT OF ACROMION FROM LEFT SCAPULA

47. 37 A2 0 SC R FR NO
ACROMION OF A RIGHT SCAPULA

48. 74 A5 0 SC L N NO
PROXIMAL PORTION INCLUDING THE GLENOID CAVITY AND A PORTION OF THE CORACOID OF A LEFT SCAPULA

49. 75 A5 0 SC R N NO
PROXIMAL PORTION INCLUDING THE GLENOID CAVITY, AND A POTION OF THE CORACOID AND ACROMION OF A RIGHT SCAPULA

50. 84 A5 0 SC L FR NO
LEFT SCAPULA FRAGMENT

51. 162 A6 0 SC U FR NO
FRAGMENT OF ACROMION SPINE

CAT# SQ I CODE SIDE SCODE MEAS

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52. 76 A5 0 SK U FR NO
TWO SKULL FRAGMENTS, ONE MAY BE PART OF THE FRONTAL

53. 175 A6 0 SK R MR NO
PORTION OF POSTERIOR RIGHT MANDIBLE WITH A BRIDGED MYLOHYOID GROOVE AND VERY LITTLE GONIAL FLARING

54. 176 A6 0 SK R&L FR NO
TWO ARTICULATED PORTIONS OF POSTERIOR RIGHT AND LEFT PARIETAL. THERE IS A PARIETAL FORAMEN ON THE RIGHT SIDE

55. 174 A6 0 SK L FR NO
PORTION OF LEFT PARIETAL WITH ARTICULATING LEFT TEMPORAL, MASTOID PROCESS SMALL INDICATING FEMALE, ELLIPTIC AUDITORY OPENING, SMALL TYMPONIC DEHISC.

56. 177 A6 0 SK U FR NO
A PORTION OF MEDIAL FRONTAL BONE DEMONSTRATING A COMPLETE METOPIC SUTURE. SUPRA ORBITAL BROW QUITE REDUCED AND SUPRA ORBITAL BORDER SHARP = FEMALE?

57. 184 A6 0 SK U FR NO
TWO PORTIONS OF AUDITORY MEATUS

58. 191 A6 0 SK R MR NO
FRAGMENT OF RIGHT MANDIBULAR ASCENDING RAMUS

59. 190 A6 0 SK U FR NO
FRAGMENT OF SPHENOID

60. 189 A6 0 SK L FR NO
FRAGMENT OF LEFT PARIETAL

61. 192 A6 0 SK L FR NO
FRAGMENT OF LEFT PARIETAL AT BREGMA

62. 193 A6 0 SK R FR NO
FRAGMENT OF RIGHT PARIETAL

63. 195 A6 0 SK U FR NO
91 VERY SMALL, UNIDENTIFIED CRANIAL FRAGMENTS

64. 194 A6 0 SK U FR NO
FRAGMENT OF FRONTAL BONE

65. 188 A6 0 SK R&L FR NO
FRAGMENT OF RIGHT AND LEFT TEMPORAL, BOTH WITH MANDIBULAR ARTICULATING FACET

66. 187 A6 0 SK U FR NO
FRAGMENT OF SPHENOID

67. 181 A6 0 SK R FR NO
FRAGMENT OF RIGHT PARIETAL

68. 180 A6 0 SK R MX NO
TWO FRAGMENTS OF RIGHT ANTERIOR MAXILLA

CAT# SQ I CODE SIDE SCODE MEAS

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69. 179 A6 0 SK FR NO
PORTION OF OCCIPITAL WITH A VERY REDUCED OCCIPITAL PROTUBERANCE AND A NUCHAL LINE INDICATIVE OF FEMALE

70. 182 A6 0 SK L FR NO
TWO FRAGMENTS OF LEFT PARIETAL

71. 183 A6 0 SK U FR NO
TWO FRAGMENTS OF SPHENOID

72. 186 A6 0 SK R FR NO
ONE FRAGMENT OF RIGHT TEMPORAL WITH MANDIBULAR ARTICULATING FACET

73. 185 A6 0 SK U FR NO
ONE FRAGMENT OF OCCIPITAL ALSO WITH A REDUCED OCCIPITAL PROTUBERANCE AND NUCHAL LINE INDICATING FEMALE

74. 178 A6 0 SK FR NO
FRAGMENT OF FRONTAL BONE, ARTICULATES WITH 25HN118-177

75. 50 A2 0 SN AX N NO
PROXIMAL PORTION OF STERNUM, CLAVICULAR NOTCH PRESENT

76. 170 A2 0 TR U CM NO
FRAGMENT OF CALCANEUS

77. 173 A3 0 TR L TL NO
FRAGMENT OF A LEFT TALUS

78. 65 A3 0 TR L CM NO
LEFT CALCANEUS, MISSING LATERAL SIDE, MAY ARTICULATE WITH SPECIMEN 25HN118-63

79. 51 A2 0 TU AX FR NO
FRAGMENTS OF THORACIC VERTEBRAE

80. 168 A2 0 TU AX FR NO
FRAGMENT OF THORACIC VERTEBRA

81. 71 A3 0 TU AX FR NO
10 FRAGMENTS OF THORACIC VERTEBRAE INCLUDING THREE BODIES AND TWO SPINUS PROCESSES, TOTAL WEIGHT OF ALL 10 FRAGMENTS IS 22 GRAMS, NO LIPPING EVIDENT

82. 104 A6 0 TU AX FR NO
NINE SMALL VERTEBRAL FRAGMENTS, TOTAL WEIGHT 7.5 GRAMS, MINIMUM OF TWO THORACIC VERTEBRAE REPRESENTED

83. 22 A1 1 FB L Q NO
DISTAL PORTION AND DIAPHYSIS OF A LEFT FIBULA, JOINS WITH SPECIMEN 25HN118-78 AND ARTICULATES WITH 25HN118-20

84. 11 A1 1 FB R Q NO
DISTAL PORTION OF A RIGHT FIBULA, LATERAL MALLEOLUS PRESENT, MALLEOLAR FOSSA ABSENT

85. 5 A0 1 FM R Q NO
DISTAL CONDYLE OF A RIGHT FEMUR, JOINS WITH SPECIMEN 25HN118-16

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86. 17 A1 1 FM L C YES
NEARLY COMPLETE LEFT FEMUR, MISSING PORTION OF THE LESSER AND GREATER TROCHANTER AND MEDIAL EPICONDYLE

87. 16 A1 1 FM R C YES
NEARLY COMPLETE RIGHT FEMUR, MISSING ONLY A PORTION OF THE DISTAL CONDYLE AND GREATER TROCHANTER, JOINS WITH SPECIMEN 25HN118-5

88. 47 A2 1 HM R C YES
COMPLETE RIGHT HUMERUS, ARTICULATES WITH 25HN118-48 & 49

89. 89 A6 1 HM L C YES
COMPLETE LEFT HUMERUS, MISSING ONLY THE GREATER TUBERCLE

90. 19 A1 1 PL L C NO
COMPLETE LEFT PATELLA, ARTICULATES WITH 25HN118-17 & 18

91. 23 A1 1 PV R IL NO
RIGHT ILIUM

92. 49 A2 1 RD R C YES
COMPLETE RIGHT RADIUS, ARTICULATES WITH 25HN118-47 & 48, POOR PRESERVATION OF STYLOID PROCESS

93. 91 A6 1 RD R N NO
PROXIMAL PORTION AND DIAPHYSIS OF A RIGHT RADIUS, DISTAL PORTION INCLUDING ULNAR NOTCH AND STYLOID PROCESS ARE MISSING

94. 24 A1 1 SA AX N NO
PROXIMAL PORTION OF THE SACRUM INCLUDING RIGHT SACRO-ILIAC JOINT.

95. 18 A1 1 TA L C YES
COMPLETE LEFT TIBIA, ARTICULATES WITH 25HN118-17 AND 25HN118-19,20 & 21

96. 9 A1 1 TA R Q NO
DISTAL PORTION OF A RIGHT TIBIA, 13 CM LONG, MEDIAL MALLEOULUS AND FIBULAR ARTICULAR SURFACE PRESENT

97. 21 A1 1 TR L CM NO
COMPLETE LEFT CALCANEUS, ARTICULATES WITH 25HN118-20

98. 20 A1 1 TR L TL NO
COMPLETE LEFT TALUS, ARTICULATES WITH 25HN118-18 & 21
SUBMITTED FOR C-3, C-4 ANALYSIS

99. 10 A1 1 TR R CM NO
COMPLETE RIGHT CALCANEUS, INDIVIDUAL #1

100. 48 A2 1 UL R C YES
COMPLETE RIGHT ULNA, ARTICULATES WITH 25HN118-47 & 49, POOR PRESERVATION BELOW STYLOID PROCESS

101. 90 A6 1 UL L N NO
PROXIMAL PORTION AND DIAPHYSIS OF A LEFT ULNA, DISTAL HEAD AND STYLOID PROCESS MISSING, MAY ARTICULATE WITH SPECIMEN 25HN118-89

102. 96 A6 2 FM R Q NO
DISTAL PORTION AND DIAPHYSIS OF A RIGHT FEMUR

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103. 101 A6 2 FM L D NO
DIAPHYSIS OF A LEFT FEMUR, JOINS WITH SPECIMEN 25HN118-94

104. 95 A6 2 FM L Q NO
DISTAL PORTION, INCLUDING THE TIBIA ARTICULAR SURFACE AND THE INTERCONDYLAR FOSSA OF A LEFT FEMUR, MAY JOIN WITH SPECIMEN 25HN118-94 &101

105. 94 A6 2 FM L Q NO
DISTAL PORTION, INCLUDING THE TIBIA ARTICULAR SURFACE OF A LEFT FEMUR, JOINS WITH SPECIMEN 25HN118-101 AND ARTICULATES WITH 25HN118-92

106. 2 A0 2 HM R D NO
RIGHT HUMERUS SHAFT, 14.5 CM LONG, GROOVE FOR RADIAL NERVE EVIDENT, PRESERVATION POOR

107. 79 A5 2 HM L Q NO
DISTAL PORTION AND DIAPHYSIS OF A LEFT HUMERUS, ARTICULATES WITH 25HN118-70

108. 99 A6 2 PL R C NO
COMPLETE RIGHT PATELLA, ARTICULATES WITH SPECIMENS 25HN118-96 & 100

109. 98 A6 2 PL L C NO
COMPLETE LEFT PATELLA, ARTICULATES WITH SPECIMENS 25HN118-92 & 94

110. 102 A6 2 RD R Q NO
DISTAL PORTION OF A RIGHT RADIUS, STYLOID PROCESS MISSING, SPECIMEN EXHIBITS A DISPLACED FRACTURE

111. 1 A0 2 TA L D YES
LEFT TIBIA SHAFT, 28 CM. LONG, RODENT GNAWING EVIDENT JOINS WITH SPECIMENS 25HN118-92 & 97

112. 97 A6 2 TA L N NO
TUBEROSITY OF A LEFT TIBIA, JOINS WITH SPECIMENS 25HN118-1 & 92

113. 100 A6 2 TA R N NO
PROXIMAL PORTION AND DIAPHYSIS OF A RIGHT TIBIA, PORTION OF THE FEMUR ARTICULAR SURFACE MISSING, ARTICULATES WITH SPECIMENS 25HN118-96 & 99

114. 92 A6 2 TA L N NO
PROXIMAL PORTION OF A LEFT TIBIA, JOINS WITH SPECIMEN 25HN118-1 & 97

115. 30 A2 2 UL R Q NO
DISTAL END AND DIAPHYSIS OF A RIGHT ULNA, MISSING CORONOID PROCESS, SEMILUNAR NOTCH AND OLECRANON, HEALED FRACTURE EVIDENT

116. 70 A3 2 UL L C YES
COMPLETE LEFT ULNA

117. 31 A2 3 FB L Q NO
LEFT FIBULA DIAPHYSIS AND DISTAL END

118. 66 A3 3 FB L D NO
DIAPHYSIS OF A LEFT FIBULA, JOINS WITH SPECIMEN 25HN118-31

119. 54 A4 3 FB R Q NO
DISTAL PORTION AND DIAPHYSIS OF A RIGHT FIBULA, PROXIMAL PORTION MISSING

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120. 13 A1 3 FM R Q NO
FRAGMENT OF A RIGHT DISTAL CONDYLE, JOINS WITH SPECIMENS 25HN118-36, 60 & 90

121. 36 A2 3 FM R Q NO
DISTAL PORTION AND DIAPHYSIS OF A RIGHT FEMUR, JOINS WITH SPECIMENS 25HN118-13, 60 & 93

122. 42 A2 3 FM L C YES
NEARLY COMPLETE LEFT FEMUR, MISSING ONLY A PORTION OF THE HEAD AND GREATER TROCHANTER, PROXIMAL HEAD SUBMITTED FOR C-3, C-4 ANALYSIS

123. 60 A3 3 FM R N YES
PROXIMAL PORTION (HEAD) OF A RIGHT FEMUR, JOINS WITH SPECIMENS 25HN118-13, 36 & 93

124. 93 A6 3 FM R D NO
DIAPHYSIS AND GREATER TROCHANTER OF A RIGHT FEMUR, JOINS WITH SPECIMENS 25HN118-13, 36 & 60

125. 3 A0 3 HM R D NO
RIGHT HUMERUS SHAFT, 12 CM LONG, PROXIMAL PORTION OF SHAFT, JOINS WITH SPECIMEN 25HN118-80

126. 28 A2 3 HM L Q YES
LEFT HUMERUS DISTAL END AND DIAPHYSIS, GREATER TUBERCLE AND PROXIMAL HEAD MISSING

127. 80 A5 3 HM R Q NO
DISTAL PORTION AND DIAPHYSIS OF A RIGHT HUMERUS, MEDIAL AND LATERAL EPICONDYLE ARE MISSING AND THE TROCHLEA AND CAPITULUM ARE DETACHED

128. 81 A5 3 RD R N NO
PROXIMAL HEAD OF A RADIUS, JOINS WITH SPECIMEN 25HN118-83

129. 83 A5 3 RD R D NO
DIAPHYSIS OF A RIGHT RADIUS, JOINS WITH SPECIMEN 25HN118-81

130. 34 A2 3 TA R N YES
PROXIMAL PORTION AND DIAPHYSIS OF A RIGHT TIBIA, DISTAL PORTION RECOVERED FROM SQUARE A-3, SPECIMEN 25HN118-61

131. 35 A2 3 TA L N NO
DIAPHYSIS AND MEDIAL CONDYLE OF A LEFT TIBIA, DISTAL PORTION RECOVERED FROM SQUARE A-3, SPECIMEN 25HN118-62

132. 62 A3 3 TA L Q YES
DISTAL PORTION AND DIAPHYSIS OF A LEFT TIBIA, FIBULAR ARTICULAR SURFACE MISSING, JOINS WITH SPECIMEN 25HN118-35 AND ARTICULATES WITH 25HN118-42

133. 61 A3 3 TA R Q YES
DISTAL PORTION AND DIAPHYSIS OF A RIGHT TIBIA, JOINS WITH SPECIMEN 25HN118-34 AND ARTICULATES WITH 25HN118-42

134. 63 A3 3 TR L TL NO
COMPLETE LEFT TALUS, MAY ARTICULATE WITH SPECIMEN 25HN118-62

135. 82 A5 3 UL R D NO
DIAPHYSIS AND PORTION OF THE SEMILUNAR NOTCH OF A RIGHT ULNA

136. 33 A2 4 FM U D NO
UNSIDED FEMUR DIAPHYSIS (POSSIBLY LEFT), REPRESENTING A JUVENILE APPROXIMATELY 15 YEARS IN AGE

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137. 43 A2 4 FM U D NO
FEMUR DIAPHYSIS, UNSIDED, (POSSIBLY LEFT) REPRESENTS A JUVENILE APPROXIMATELY 15 YEARS IN AGE

138. 69 A3 4 RD L Q NO
DISTAL PORTION OF A LEFT RADIUS, UNFUSED EPIPHYSIS MISSING, REPRESENTS A JUVENILE APPROXIMATELY 15 YEARS IN AGE

139. 32 A2 4 TA R D NO
DIAPHYSIS OF A RIGHT TIBIA, JOINS WITH SPECIMEN 25HN118-58, REPRESENTS A JUVENILE APPROXIMATELY 15 YEARS OF AGE

140. 58 A3 4 TA R D NO
DIAPHYSIS OF A RIGHT TIBIA, JOINS WITH SPECIMEN 25HN118-32, REPRESENTS A JUVENILE APPROXIMATELY 15 YEARS OF AGE

APPENDIX B

OSTEOLOGICAL MATERIAL RECOVERED FROM SITE 25HN174

LEGEND

CAT# : Catalog Number

SQ : Square
B1 = Square #1, Site 25HN174

I : Individual
5 = Individual #1, 25HN174

CODE : Description of Bone Element or Unit
AX = Axial Skeleton
CP = Carpal
CV = Clavical
DE = Dentition
FB = Fibula
FM = Femur
FR = Fragment
HM = Humerus
LU = Lumbar Vertebra
MC = Metacarpal
MT = Metatarsal
PH1 = Proximal Phalanx
PH2 = Medial Phalanx
PH3 = Distal Phalanx
PL = Patella
PV = Pelvis
RB = Rib
RD = Radius
SA = Sacrum
SC = Scapula
SK = Skull
SN = Sternum
TA = Tibia
TR = Tarsal
TU = Thoracic Vertebra
UL = Ulna

SIDE : Side
AX = Axial
L = Left
R = Right
U = Unsided

SCODE : Additional Description of Element
C = Complete
CM = Calcaneus
D = Diaphysis
FR = Fragment
IL = Ilium
IS = Ischium
MR = Molar
MX = Maxilla
N = Proximal
PB = Pubis
Q = Distal
SA = Sacrum
TL = Talus

MEAS : Measurable
NO = No Measurements Taken
YES = Measurements Taken

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1. 143 B1 5 AX AX FR NO
   10 VERTEBRAL FRAGMENTS, TOTAL WEIGHT OF 8.5 GRAMS, MINIMUM OF ONE BODY PRESENT, MAY BE THORACIC, BONE #B-29
2. 153 B1 5 AX AX FR NO
   NEARLY COMPLETE 2ND CERVICAL VERTEBRA, FRAGMENT FROM 1ST CERVICAL VERTEBRAE AND NINE MISCELLANEOUS FRAGMENTS OF CERVICAL VERTEBRAE
3. 151 B1 5 AX AX FR NO
   17 SMALL FRAGMENTS OF A VERTEBRAE, TOTAL WEIGHT 4.0 GRAMS

4. 145 B1 5 AX AX FR NO
   FIVE SMALL VERTEBRAL FRAGMENTS INCLUDING ONE INFERIOR ARTICULAR PROCESS, TOTAL WEIGHT IS 2 GRAMS, BONE #B-32
5. 129 B1 5 CP R C NO
   COMPLETE RIGHT NAVICULAR CARPAL, BONE #B-19

6. 128 B1 5 CP R C NO
   COMPLETE RIGHT CAPITATE, BONE #B-19

7. 130 B1 5 CP R C NO
   COMPLETE RIGHT LUNATE, BONE #B-19

8. 131 B1 5 CP L C NO
   COMPLETE LEFT LESSER MULTANGULAR, BONE#B-19

9. 149 B1 5 CP R C NO
   COMPLETE RIGHT GREATER MULTANGULAR CARPAL

10. 127 B1 5 CV L FR NO
    FRAGMENTS OF THE LEFT CLAVICAL, BONE # B-18

11. 126 B1 5 CV R C NO
    COMPLETE RIGHT CLAVICAL MISSING ONLY THE EXTREME DISTAL PORTION BONE #B-17
12. 116 B1 5 FB L M NO
    PROXIMAL PORTION AND DIAPHYSIS OF A LEFT FIBULA, BONE #9

13. 121 B1 5 FB R C YES
    COMPLETE RIGHT FIBULA, MISSING ONLY A PORTION OF THE STYLOID PROCESS, BONE #B-12
14. 106 B1 5 FM R C YES
    COMPLETE, BUT FRAGMENTARY, RIGHT FEMUR, BONE #B-2

15. 105 B1 5 FM L C YES
    COMPLETE LEFT FEMUR, MISSING ONLY A PORTION OF THE MEDIAL EPICONDYLE AND PATELLAR ARTICULAR SURFACE, BONE #B-1
16. 114 B1 5 FR U >R NO
    FOUR SMALL UNIDENTIFIED BONE FRAGMENTS, TOTAL WEIGHT 1.5 GRAMS

17. 148 B1 5 FR U FR NO
    APPROXIMATELY 150 SMALL UNIDENTIFIED BONE FRAGMENTS, TOTAL WEIGHT 31.0 GRAMS

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18. 125 B1 5 HM L C NO
FRAGMENTS OF A COMPLETE LEFT HUMERUS MISSING ONLY THE NECK, BONE #B-16

19. 139 B1 5 HM R Q NO
DISTAL PORTION AND DIAPHYSIS OF A RIGHT HUMERUS, MEDIAL EPICONDYLE AND PROXIMAL HEAD MISSING, BONE #B-25

20. 133 B1 5 LU AX FR NO
FRAGMENTS OF THE 2ND THROUGH 5TH LUMBAR VERTEBRAE, BONE #B-21

21. 156 B1 5 MC U FR NO
FRAGMENT OF DISTAL METACARPAL

22. 157 B1 5 MC U FR NO
FRAGMENT OF DISTAL METACARPAL

23. 158 B1 5 MC U FR NO
FRAGMENT OF DISTAL METACARPAL

24. 108 B1 5 MT R C NO
COMPLETE FIRST RIGHT METATARSAL, BONE #B-4

25. 109 B1 5 MT U C NO
COMPLETE METATARSAL, BONE #B-4

26. 110 B1 5 PH1 U C NO
COMPLETE PROXIMAL TOE PHALANX, BONE #B-6

27. 155 B1 5 PH2 U C NO
COMPLETE MEDIAL CARPAL PHALANX

28. 154 B1 5 PH2 U C NO
COMPLETE MEDIAL CARPAL PHALANX

29. 152 B1 5 PH2 U C NO
ONE COMPLETE MEDIAL CARPAL PHALANX

30. 134 B1 5 PH3 U C NO
ONE COMPLETE DISTAL CARPAL PHALANX

31. 159 B1 5 PH3 U C NO
ONE COMPLETE DISTAL CARPAL PHALANX

32. 123 B1 5 PL L C NO
COMPLETE LEFT PATELLA, BONE #B-14

33. 122 B1 5 PV R FR NO
RIGHT PELVIS MISSING POSTERIOR PORTION OF ILIUM AND PUBIS, BONE #B-13

34. 124 B1 5 PV L FR NO
FRAGMENTS OF LEFT PELVIS INCLUDING ILIUM AND MAJORITY OF ACETABULUM, BONE #B-15

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35. 137 B1 5 RB U FR NO
UNSIDED SMALL RIB FRAGMENT, BONE #B-23

36. 140 B1 5 RB U FR NO
THREE UNSIDED SMALL RIB FRAGMENTS, TOTAL WEIGHT IS 2.5 GRAMS, BONE #B-26

37. 142 B1 5 RB U FR NO
77 UNSIDED SMALL RIB FRAGMENTS, TOTAL WEIGHT IS 64.5 GRAMS, BONE #B-28

38. 141 B1 5 RB U N NO
ONE PROXIMAL RIB FRAGMENT, BONE #B-27

39. 147 B1 5 RB U FR NO
83 UNSIDED SMALL RIB FRAGMENTS, TOTAL WEIGHT IS 64 GRAMS, BONE #B-34

40. 117 B1 5 RD L C YES
COMPLETE LEFT RADIUS, MISSING ONLY THE STYLOID PROCESS, BONE #10

41. 135 B1 5 RD R C YES
COMPLETE RIGHT RADIUS, BONE #B-22

42. 138 B1 5 SA AX N YES
PROXIMAL PORTION OF A SACRUM, BONE #B-24

43. 146 B1 5 SC R FR NO
30 FRAGMENTS OF RIGHT SCAPULA INCLUDING ACROMION PROCESS AND AXILLARY BORDER, BONE #B-33

44. 150 B1 5 SC L FR NO
TWO FRAGMENTS OF ACROMION PROCESS AND ONE FRAGMENT OF LATERAL LEFT CLAVICLE

45. 132 B1 5 SK AX FR NO
FRAGMENT OF SPHENOID, BONE #B-19

46. 115 B1 5 TA L N NO
FRAGMENTS OF THE PROXIMAL PORTION AND DIAPHYSIS OF A LEFT TIBIA, BONE #9

47. 120 B1 5 TA R C YES
COMPLETE RIGHT TIBIA, MISSING ONLY A PORTION OF THE MEDIAL MALLEOLUS AND FIBULAR ARTICULAR SURFACE, BONE #12

48. 107 B1 5 TR L CM NO
COMPLETE LEFT CALCANEUS, MISSING LATERAL BORDER, BONE #B-3

49. 112 B1 5 TR R CM NO
COMPLETE RIGHT CALCANEUS, BONE #7

50. 111 B1 5 TR R C NO
COMPLETE RIGHT CUBOID, BONE #B-6

51. 113 B1 5 TR R TL NO
COMPLETE RIGHT TALUS, BONE #7

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52. 119 B1 5 TU AX FR NO
    36 SMALL FRAGMENTS OF THORACIC VERTEBRAE, TOTAL WEIGHT 11 GRAMS, MINIMUM OF TWO BODIES PRESENT, BONE #B-11
53. 144 B1 5 TU AX FR NO
    13 SMALL THORACIC VERTEBRAE FRAGMENT, TOTAL WEIGHT 10 GRAMS, MINIMUM OF TWO SPINOUS PROCESSES PRESENT, BONE #B-31
54. 118 B1 5 UL L C YES
    COMPLETE LEFT ULNA, MISSING ONLY THE STYLOID PROCESS, BONE #10

55. 136 B1 5 UL R C YES
    COMPLETE RIGHT ULNA, BONE #B-22